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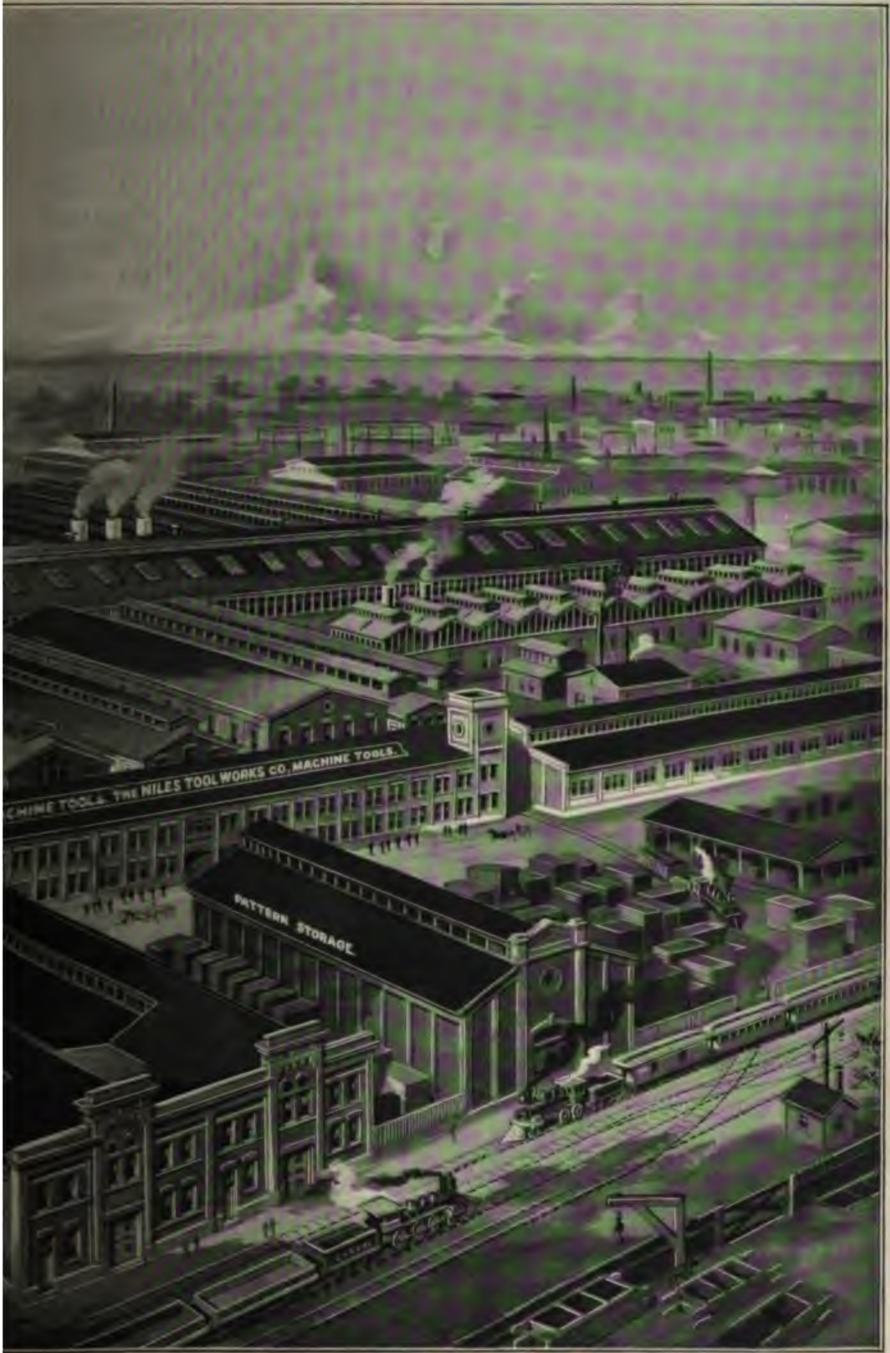
THE NILES TOOL WORK

FLOOR SPACE, F


CHINE TOOLS. THE NILES TOOL WORKS CO. MACHINE TOOLS.
PATTERN STORAGE

AMILTON, OHIO, U. S. A.

S, UNDER ROOF.

ALEXANDER GORDON,
President.

ROBT. C. McKINNEY,
Treasurer and General Manager.

JAS. K. CULLEN,
Secretary.

General Machinery
CATALOGUE
THE NILES TOOL WORKS CO.

◆

IRON AND STEEL WORKING MACHINERY

HAMILTON, OHIO, U. S. A.

◆

EASTERN WAREROOMS AND OFFICE

136 and 138 Liberty Street, NEW YORK

1898

◆

BRANCH OFFICES:

BOSTON PHILADELPHIA PITTSBURG CHICAGO
ST. LOUIS LONDON, ENGLAND

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THE REPUBLICAN PUBLISHING CO.
COMMERCIAL AND CATALOGUE PRINTERS,
HAMILTON, OHIO

INTRODUCTION.

IN this catalogue we present a full line of machine tools and appliances manufactured at our extensive Works at Hamilton, Ohio, and handled at our Ware-rooms and Offices in the leading cities in this country and Europe. We have endeavored to make the catalogue complete and comprehensive, illustrating as fully as possible such machinery of every type required in the equipment of shops and factories for the manufacture of every variety and character of work in iron and steel.

Our plant at Hamilton is large and complete in every respect. Fifteen acres of floor space is under roof, making it the largest works in the world devoted exclusively to the manufacture of machine tools, and our appointments, appliances and facilities for handling work expeditiously and economically are of the very best, including thirty over-head traveling cranes, from five to thirty tons capacity each, and machinery of the highest grade of excellence for the accurate and economical production of work. Large and fully equipped tool rooms for the maintenance of our shop tools are provided.

Separate and distinct departments are engaged in the manufacture of certain standard tools exclusively, such as Boring and Turning Mills, Lathes, Planers, etc., and are fully and completely equipped for turning out such machines in quantities under the best systems of manufacture.

We cordially invite all interested in machinery, or contemplating purchasing, to visit our works, where every opportunity will be extended to thoroughly inspect our product in process of construction and in operation.

NILES TOOL WORKS BUILDING,
Liberty, Washington and Cedar Streets, New York City.

EASTERN OFFICE AND WARE ROOMS.

FOR the convenience of our trade in the East, we have established large Ware Rooms and Offices in New York, corner of Liberty, Washington and Cedar streets, where a full line of machine tools is carried in stock.

This office gives its attention to a general line of machinery, and can give full and complete information and lowest prices on miscellaneous machinery and appliances of every description.

In addition to the ordinary line of machine tools, we represent the largest and most favorably known builders of Overhead Power Traveling Cranes, Hydraulic Machinery, Punching and Shearing Machines, Steam Hammers, etc.

Full information and prices can also be obtained at any of our other Branch Offices.

With these superior facilities, which enable us to give better service than ever before, we will aim, by the maintenance of a high order of workmanship and constant improvements in our patterns, to merit a continuance of the liberal patronage we have hitherto enjoyed.

Respectfully,
The NILES TOOL WORKS Co.

NOTES.

Prices.

Quoted upon inquiry.

Illustrations.

Specifications.

Represent machines at this time. From time to time improvements are made. Photographs or cuts will accompany all propositions for machines, illustrating and describing the latest designs.

Correspondence.

All letters should be addressed to The NILES TOOL WORKS Co., at any of the following:

HAMILTON, OHIO.
NEW YORK, N. Y.—136 and 138 Liberty Street.
BOSTON, MASS.—65 and 67 Oliver Street.
PHILADELPHIA, PA.—Bourse Building.
PITTSBURG, PA.—Carnegie Building.
CHICAGO, ILL.—Western Union Building.
ST. LOUIS, MO.—615 North Fourth Street.
LONDON, S. W., ENGLAND.—39 Victoria Street.

CONTENTS.

PART — PAGES

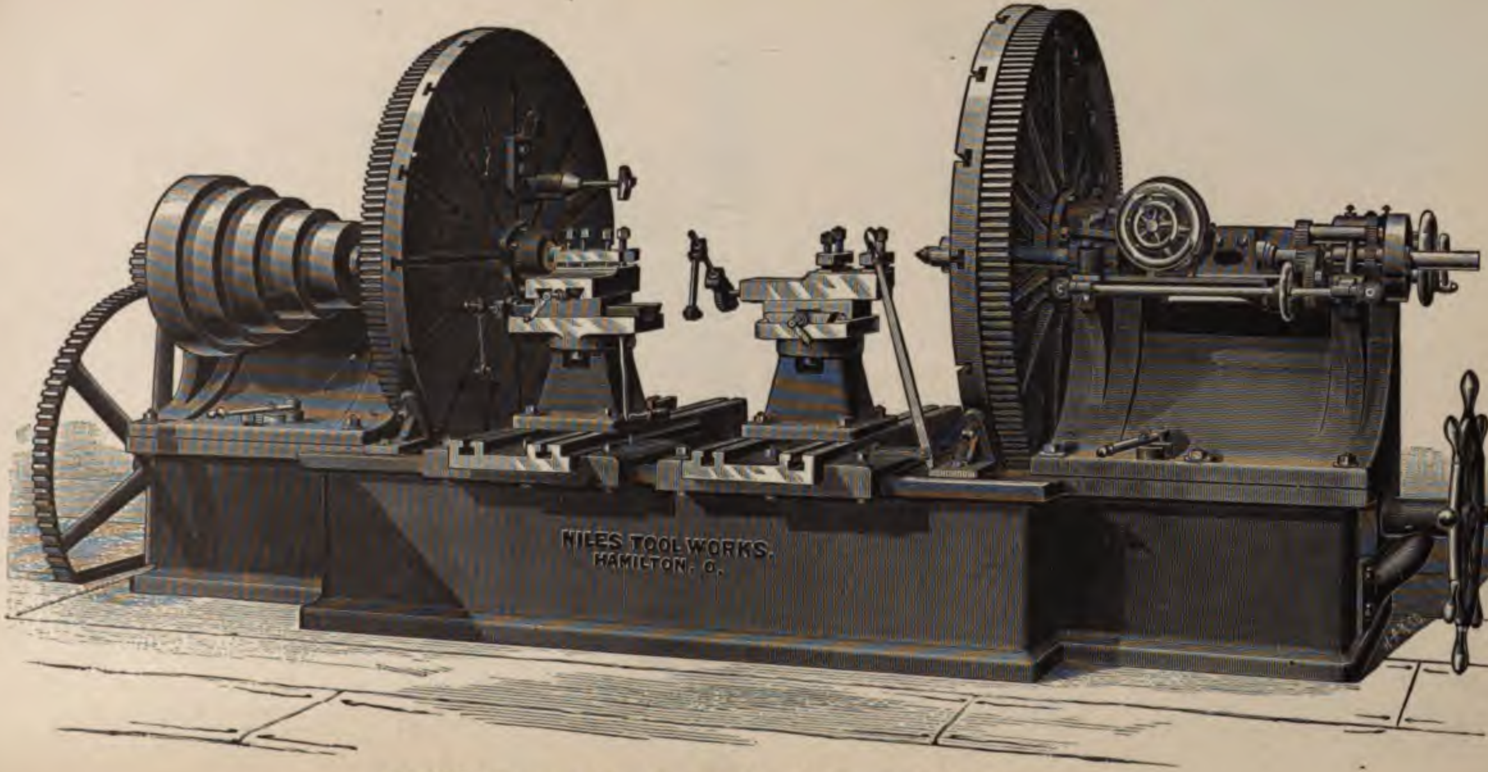
I. Railroad Machinery 1
II. Lathes 21
III. Forming Lathes 63
IV. Screw Machines 67
V. Pulley Machinery 77
VI. Cutting-Off Machines 85
VII. Planing Machines 89
VIII. Shaping Machines 109
IX. Drilling Machines 117
X. Boring Machines 161
XI. Boring and Turning Machines 175
XII. Slotting Machines 185
XIII. Key-Seating Machines 191
XIV. Milling Machines 195
XV. Rack and Gear-Cutting Machines 231
XVI. Metal Sawing Machines 245
XVII. Bolt and Nut Machinery 255
XVIII. Pipe-Cutting and Threading Machinery 267
XIX. Punching and Shearing Machines 271
XX. Power Bending Rolls 303
XXI. Riveting Machines 323
XXII. Miscellaneous Pneumatic and Hydraulic Machinery 347
XXIII. Cranes and Hoists 363
XXIV. Blowers and Forges 377
XXV. Presses 389
XXVI. Power Hammers 401
XXVII. Bulldozers 419
XXVIII. Grinding Machines 425
XXIX. Wood-Working Machines 463
XXX. Miscellaneous Machinery 479

TELEGRAPH CODE.

Prices 529
Discounts 529
Orders 531
Shipments 532
Index to Code Words 533

PART I.

RAILROAD MACHINERY.


NILES TOOL WORKS.
HAMILTON, O.

DRIVING-WHEEL LATHE, WITH QUARTERING ATTACHMENT.

DRIVING-WHEEL LATHES.

All these lathes have two heads, face-plates and carriages for turning a pair of drivers on their axles, with ample power to take two heavy cuts at the same time.

Main spindles are large in diameter, with long bearings, and have internal sliding spindle with sufficent travel to clear the longest crank-pins.

Driving shafts are large, solid steel forgings, free from torsion, insuring great steadiness of motion under heavy cuts.

Face-plates may be driven together or seperately, as desired, and at the same or different speeds, and made of sufficent diameter to afford clamping room for tires for boring.

All gearing cut from the solid, and the face-plate gears are not cast solid with the face-plates, but bolted securely to them to be readily replaced in case of accidents.

The front section of bed forms the slides for the carriages and is carried up to give great stiffness at point of cutting strain and permits the use of short tool-rests. The bed is triple webbed.

Feeds are automatic; by a special device arranged to secure proper speeds for turning both tires and journals.

The right-hand head is arranged to slide, to accommodate axles of different lengths, operated by hand gearing.

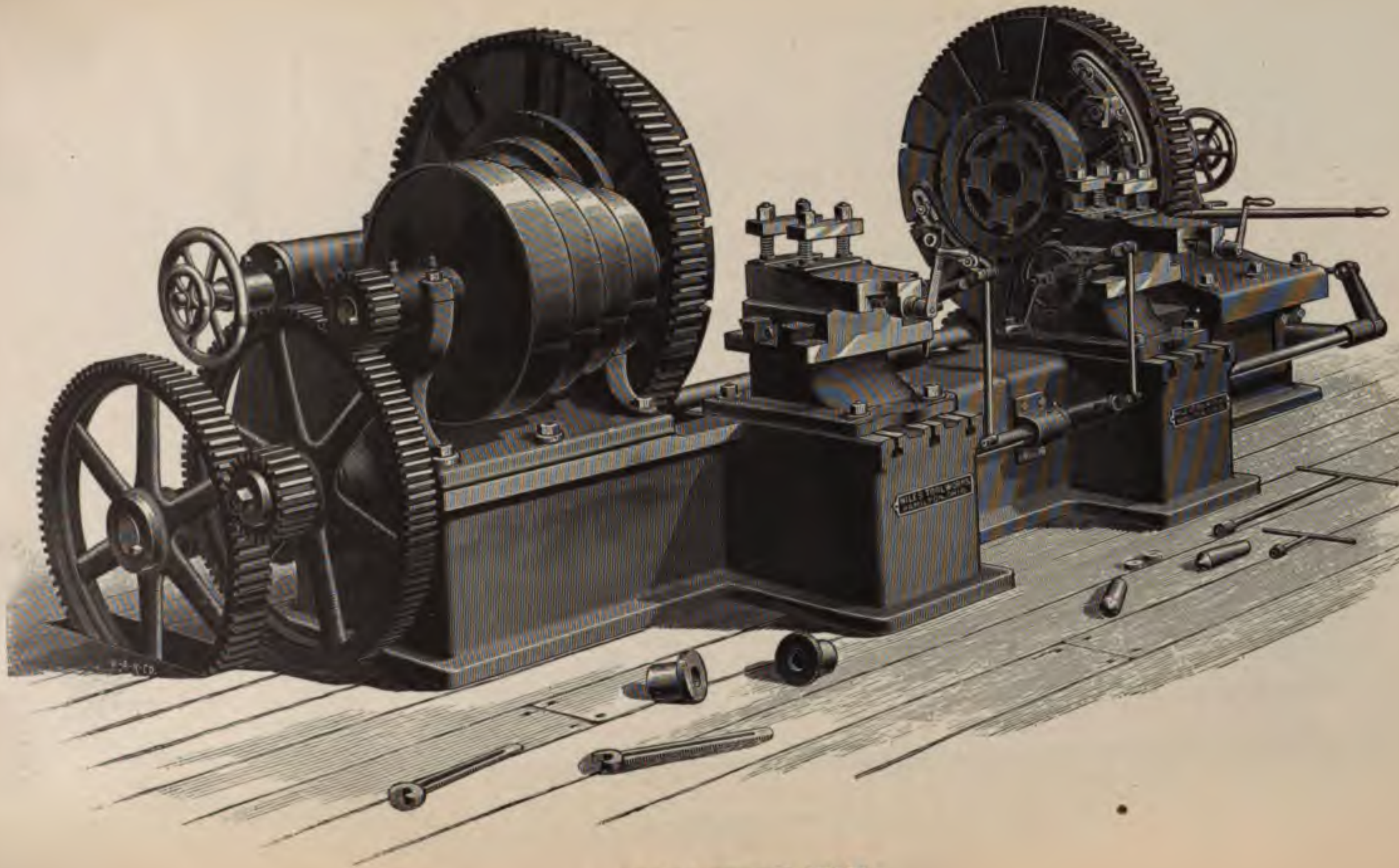
Counter-shaft pulleys, 36 inches diameter, 6¾ inches face. Speed, 60-inch, 66-inch and 69-inch, 80-revolutions; 79-inch 65 revolutions; 84-inch and 90-inch, 50 revolutions.

Quartering and Crank-pin Boring Attachments furnished on one or both heads as desired.

Lathes made any length.

TABLE OF SIZES.

Size of Machine.	Will take Wheels on Tread.	Minimum Distance Between Face Plates.	Maximum Distance Between Face Plates.	Weight.	Without Quartering Attachment.		With Single Quartering Attachment.		With Double Quartering Attachment.	
					Code Word.	Price.	Code Word.	Price.	Code Word.	Price.
60"	54"	7' 6"	9'	....	Macadamize	$..........	Macaroni	$..........	Mace	$..........
66"	60"	7' 6"	9'	....	Maceration	$..........	Mackerel	$..........	Mackintosh	$..........
69"	66"	7' 6"	9'	....	Madhouse	$..........	Madly	$..........	Madness	$..........
79"	72"	7' 6"	9'	....	Magazine	$..........	Maggot	$..........	Magic	$..........
84"	78"	7' 6"	9'	....	Magician	$..........	Magistrate	$..........	Magnetic	$..........
90"	84"	7' 6"	9'	....	Magnolia	$..........	Magpie	$..........	Maiden	$..........



CAR-WHEEL LATHE.

CAR-WHEEL LATHE.

Swings 48 inches, and will turn wheels from 33 inches to 42 inches diameter.

This Lathe is specially designed for turning steel-tired car and truck-wheels concentric with the axle-journals without respect to the original centers on which the axles were turned. These centers can be used, however, at any time desired.

The axle-journals are gripped by self-centering, four-jawed chucks in each face-plate. The jaw-faces are self-adjusting as to alignment of axle, and never impose bending strains on the journals.

The face-plates carry adjustable-drivers which engage the bolt-heads on sides of wheels near the rims.

Both heads have sliding spindles with centers. The centers are capped and may be adjusted against the ends of the axle to prevent end motion.

The right-hand head is movable on bed to suit length of axles.

The minimum distance between face-plates is 5 feet 6 inches; the maximum distance, 7 feet 4 inches.

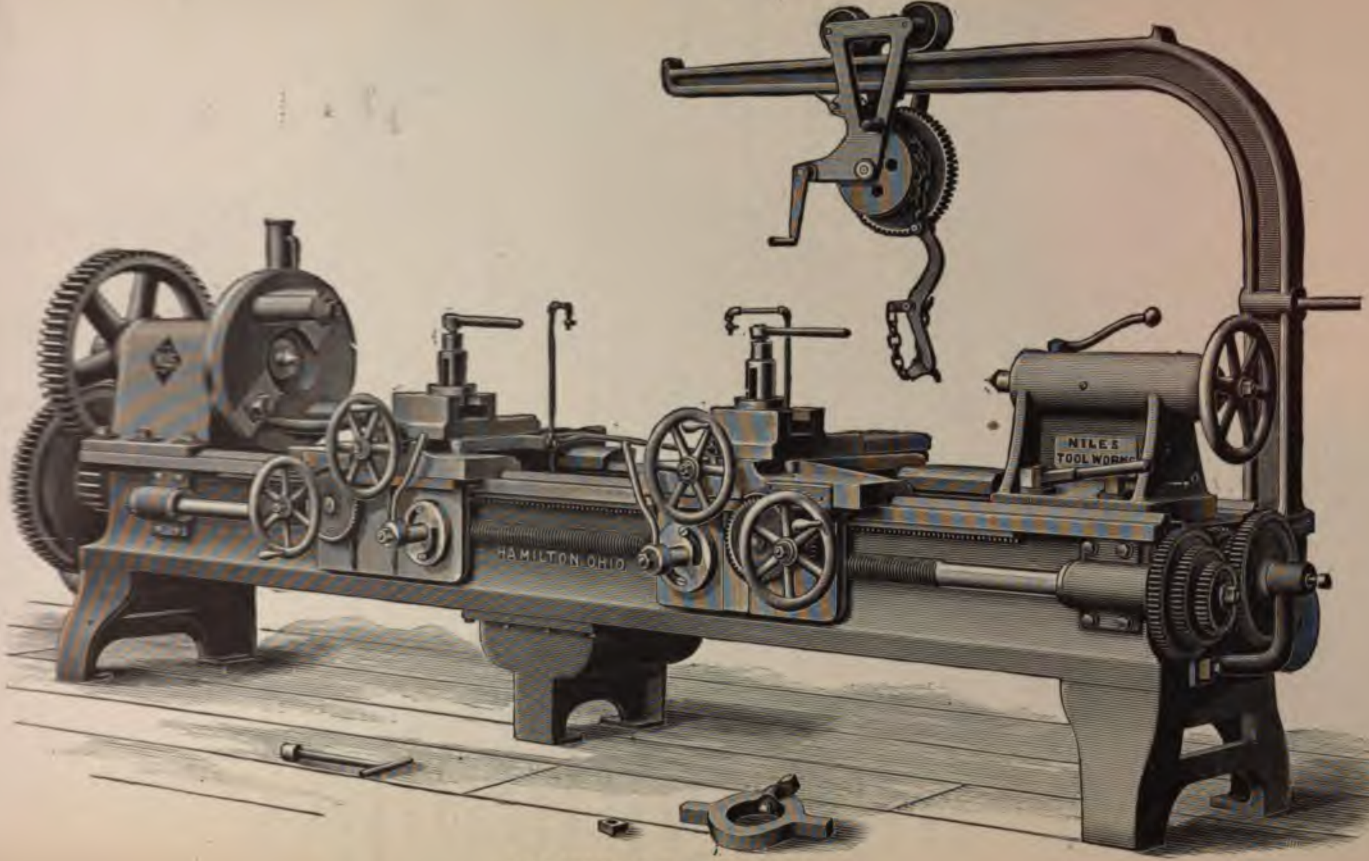
The gearing is all cut from the solid and is amply strong.

The feed is by ratchet movement, all contained in the machine and no overhead rocker-shafts are required.

A gauging and calipering attachment can be supplied with the lathe, which insures accuracy and reduces the time to a minimum. The device acts as a track-gauge, serves as a templet for flange and tread at the same time and is never in the way when not wanted.

The counter pulleys are 28 inches diameter, 6½ inches face. Speed, 90 revolutions.

Code Word, Maintainer. Weight.................... .... Price, $........................



LOCOMOTIVE AXLE LATHE.

LOCOMOTIVE AXLE LATHE.

End Drive and Two Carriages.

This lathe is intended for turning axles all over, in which case a bracket for carrying a taper attachment, or a former to give correct shape to the middle of the axle, is placed on back of bed.

The driving-gear is placed at one end, is very powerful and will pull all that the axle will stand. An equalizing driver is attached to face-plate to take the dog at both ends.

The bed is very heavy, well braced and has trough and reservoir in center leg for conveying and holding the lubricant, which is supplied by a power pump and stand-pipe.

The carriages are well gibbed to the bed, are fed by large screw and have hand adjustment and open feed-nuts.

Positive gear feed, with three changes by pull-pin, provided.

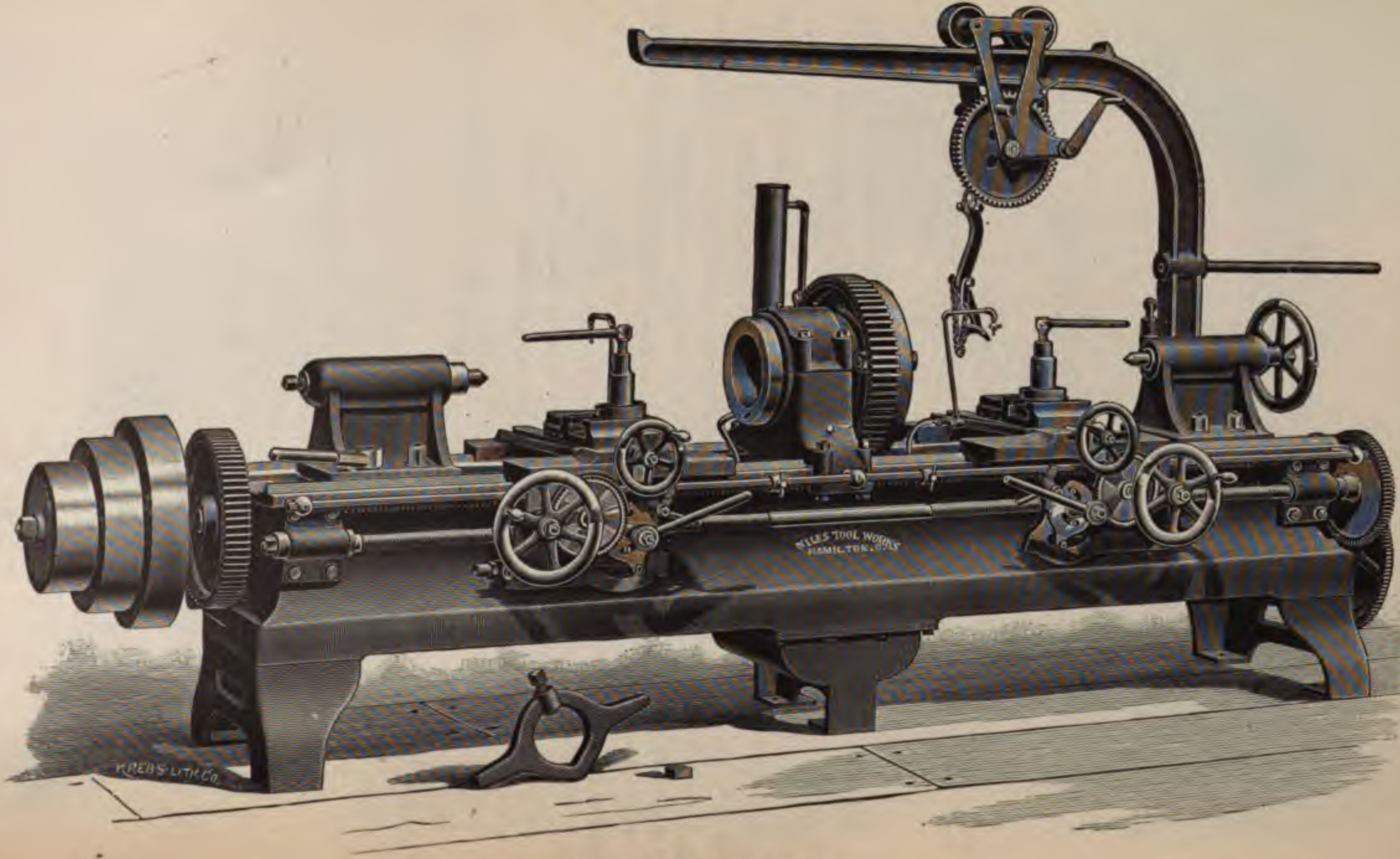
With bed 12 feet 4 inches long, will take 7 feet 6 inches between centers.

A crane for handling axles in and out of machine is supplied when ordered.

Driving cone has three steps for 4½-inch belt.

Counter pulleys are 26 inches diameter for 5-inch double belt. Speed, 280 revolutions for cutting speed of 18 to 38 feet on 6-inch diameter.

Code Word, Makebate. Weight...................... Price, $.......................


NILES TOOL WORKS
HAMILTON, O.
KREBS LITH. CO.

DOUBLE AXLE LATHE.

DOUBLE AXLE LATHE.

For Locomotive and Car-Axles.

Axles are run on dead centers, are driven from the middle by an equalizing driver-plate and thus relieved from the strains which would otherwise be produced by irregularities in the forging.

The carriages have two power feeds, and automatic stops. Both ends of axle can be turned at same time.

The center head can be adjusted along the bed.

The middle leg forms a lubricant reservoir. The carriages are arranged to conduct the lubricant to a trough in the bed, and thence to the reservoir. A power pump supplies same to the tools.

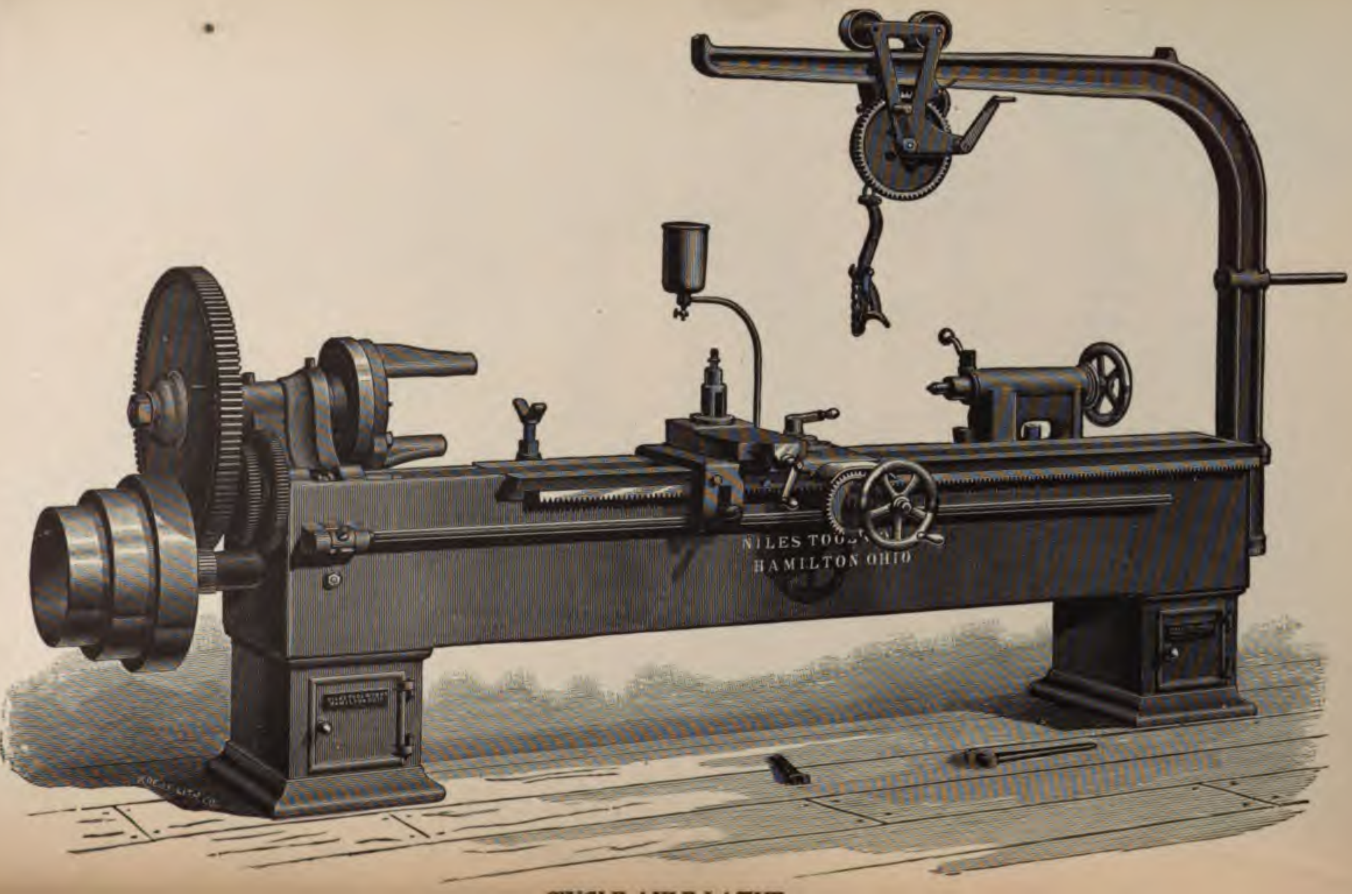
Length of bed, 11 feet 3 inches; maximum distance between centers, 7 feet 8 inches.

Capacity is nearly double that of the best Single Axle Lathe built.

A convenient crane is provided by which one man can easily handle the axles.

Counter pulleys are 18 inches diameter for 4-inch belt, and run 160 revolutions.

Code Word, Makable. Weight........................ Price $.........................


NILES TOO
HAMILTON OHIO

SINGLE AXLE LATHE.

Designed for Turning Car and Locomotive-Axles.

We build this machine mainly for the accommodation of the smaller roads and repair shop having but little of this work to do, and we recommend its use in such places only. For shops having a large quantity of axles the Double Axle Lathe is preferred in point of economy. The Double Axle Lathe will do nearly double the amount of work at the same outlay for labor and expenses.

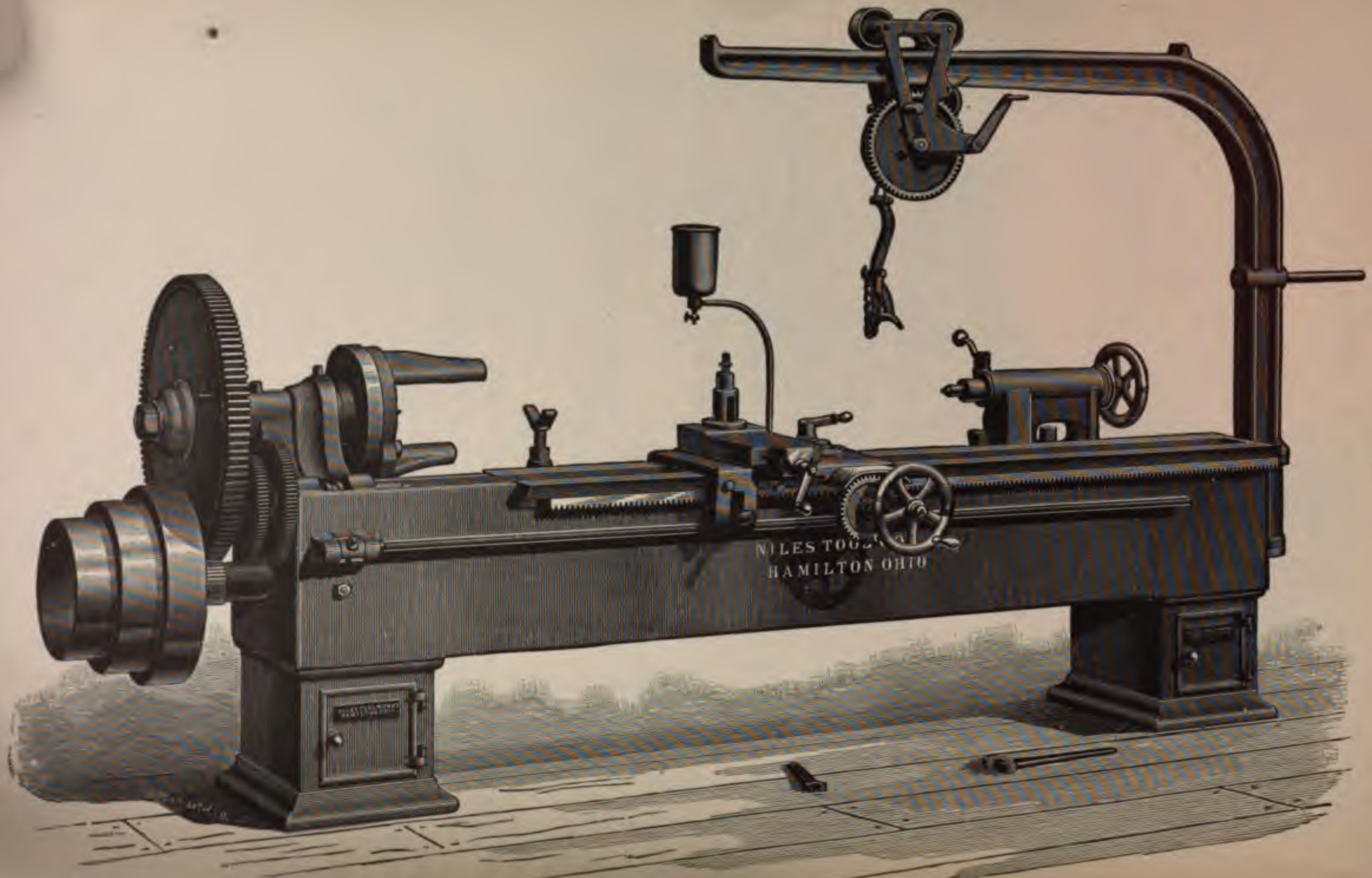
The driving cone has three steps for 3½-inch belt, and is strongly geared. Two changes of feed, for roughing and finishing, provided; the change from one to the other is made instantly without the necessity of the operator changing his position.

The machine has a bed 10 feet 2 inches long, to take 7 feet 6 inches between centers.

The face-plate carries a self-adjusting driver.

Counter-shaft has three pulleys, with two speeds, giving six changes. The pulleys are 20 inches diameter, 8 inches face. Speeds, 90 and 120 revolutions.

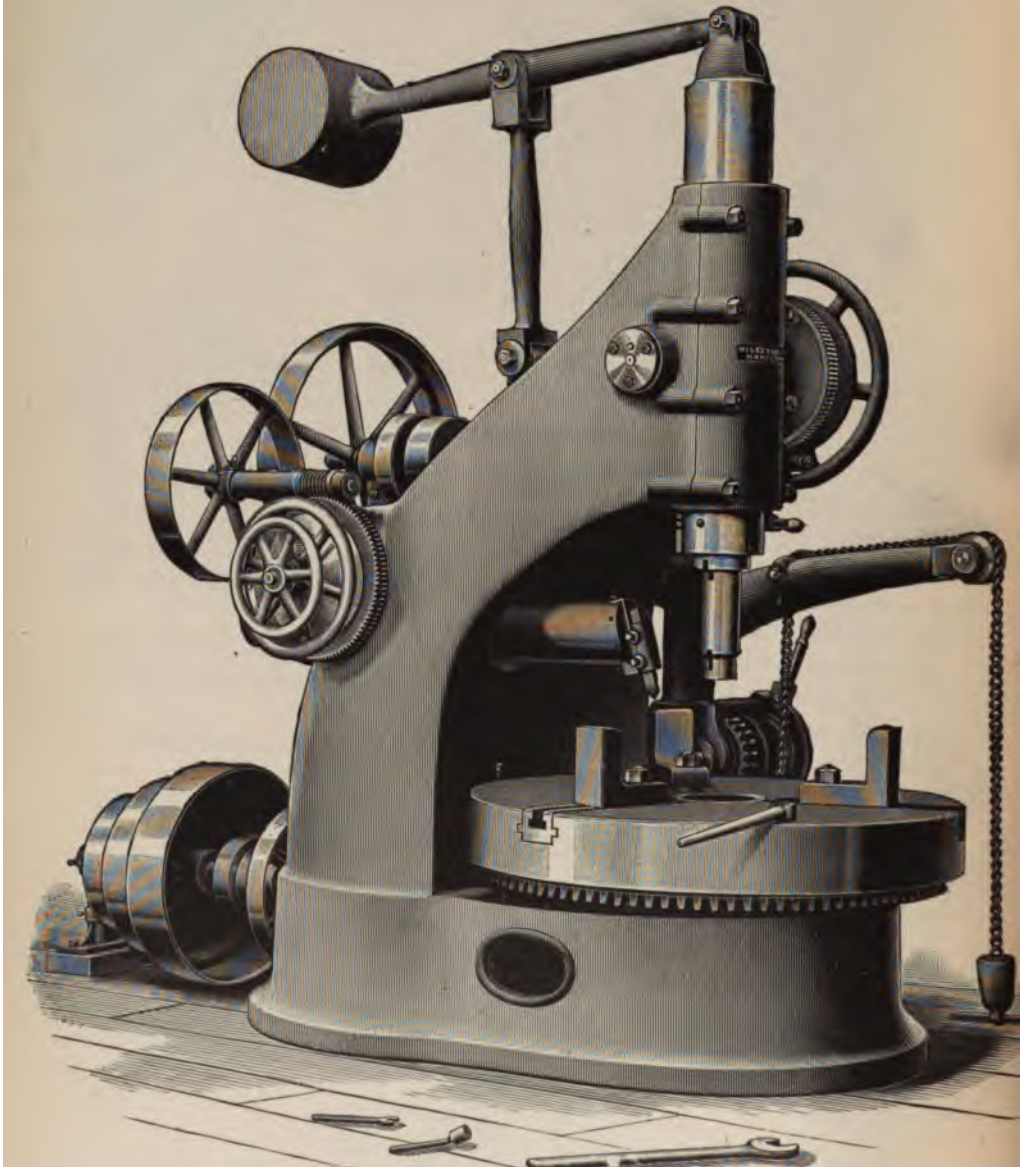
Code Word, Majority. Weight........................ Price, $......... ....



SINGLE AXLE LATHE

[illegible]

Size of Machine.	Diameter of Chuck-Table.	Counter-[illegible] Pulleys.			[illegible]	[illegible]	[illegible]	[illegible]
		Diameter.	Face.	Speed.				
36″ 42″	41″ 48″	20″ 30″	5″ 6½″	100 70	12″ 12″	[illegible] 4½″	[illegible] 200	[illegible]



CAR-WHEEL BORING MACHINE, WITH POWER HUB-FACER.

CAR-WHEEL BORING MACHINES.

For Boring Car-Wheels.

The chucks are self-centering, with independent jaws.

The tool-bars are counter-weighted, have quick return and provision is made for taking up any wear.

Every gear about the machine is accurately cut from the solid.

The machines are provided with power crane, by means of which wheels may be handled with the greatest ease and very rapidly. The crane-beam is low and may be swung under the tool-bar directly over the center of the chuck.

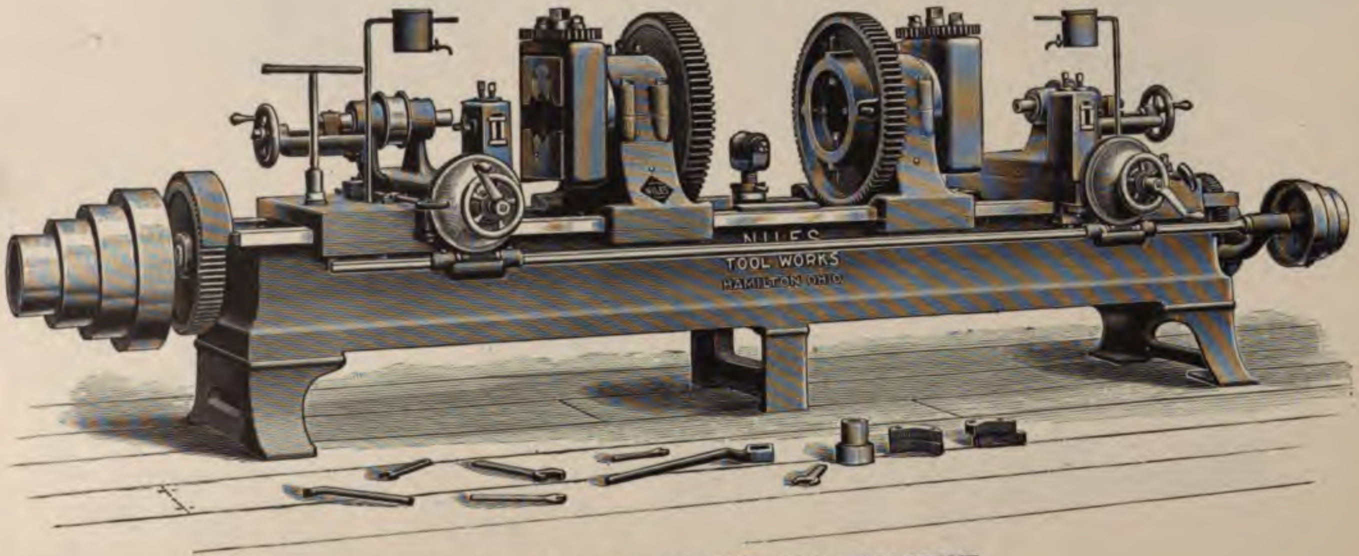
There are three changes of feed, two for roughing and one for finishing. The change from one to the other is made instantly, without changing belts or gears, and a feed of ⅜-inch is obtained.

The Power Hub-Facer is intended to face the hub while being bored. It consists of heavy tool-bar passing through column. An adjustable tool-holder on inner end reaches hub without interfering with boring-tool. Power feed and quick return by hand are provided.

The machines have broad bases, are substantial throughout and the form of columns is such as to insure great stiffness.

TABLE OF SIZES.

Size of Machine.	Diameter of Chuck-Table.	Counter-Shaft Pulleys.			Crane Counter Pulleys.			With Power Crane.			With Power Crane and Power Hub-Facer		
		Diameter.	Face.	Speed.	Diameter.	Face.	Speed.	Code Word.	Weight.	Price.	Code Word.	Weight.	Price.
36"	41"	20"	5"	100	12"	4¼"	200	Maladdress	....	$............	Maladroit	....	$ ....
42"	48"	30"	6½"	70	12"	4½"	200	Malady	....	$............	Malapert	....	$ ....



DOUBLE CUTTING-OFF AND CENTERING MACHINE.

DOUBLE CUTTING-OFF AND CENTERING MACHINE.

Designed for Locomotive and Car-Axles.

Will cut off and center shafts up to 9 inches diameter, 8 feet 6 inches long, cutting off both ends at one time.

The axle revolves in powerful, self-centering chucks, each chuck being driven by spur-gear and pinion.

The chuck-heads and carriages are adjustable to any position on the bed, to suit varying lengths of axles.

The driving cone has four steps for 4-inch belt.

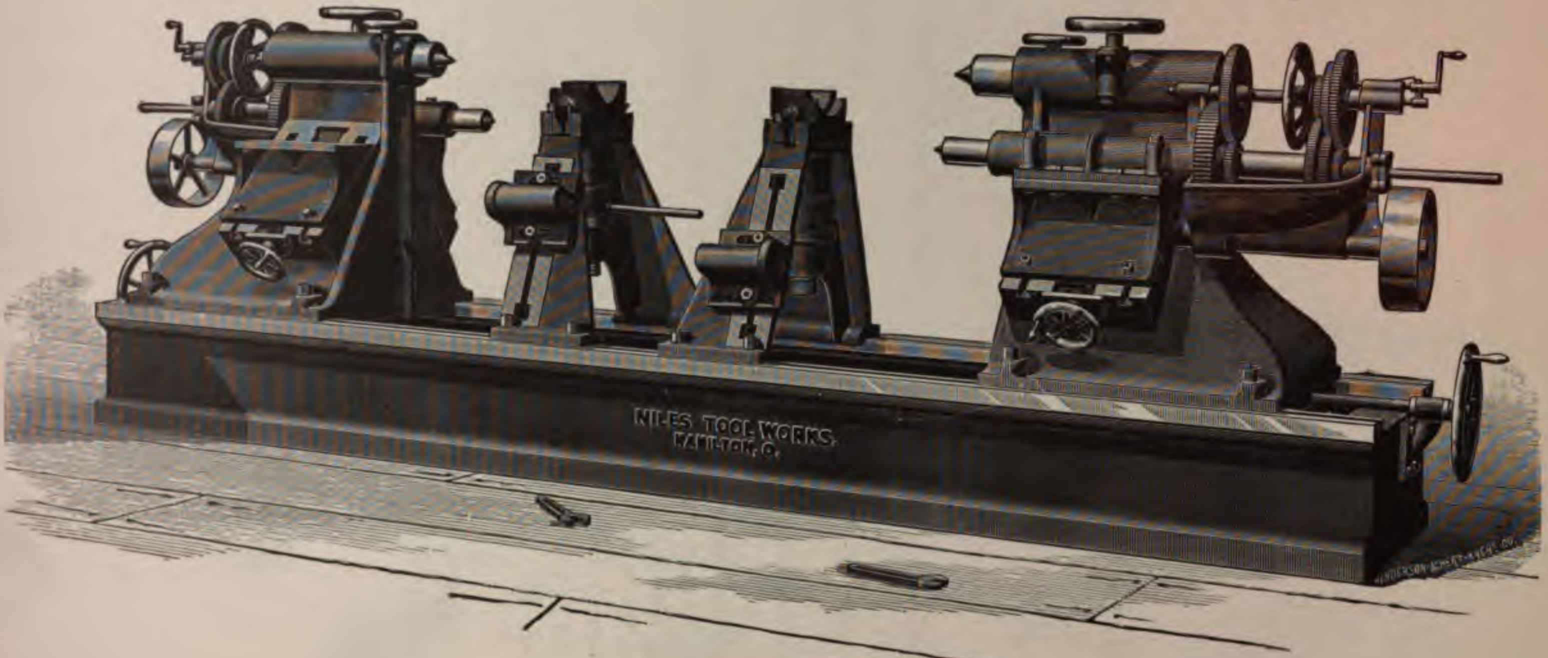
Counter-shaft has double set of pulleys, giving six changes of speed, so arranged that the speed can be changed instantly as the cutting-off tool approaches the center.

The tool-slides have power feed, with three changes.

The center drills are driven independently. The drill-heads are arranged to slide back to give clearance when putting in axles.

Counter-shaft pulleys, 20 inches diameter, 8½ inches face. Speeds, 250 and 325 revolutions.

Code Word, Majesty. Weight........................ Price, $........................


NILES TOOL WORKS.
HAMILTON, O.

QUARTERING MACHINE.

QUARTERING MACHINES.

For Quartering and Boring Crank-pin Holes in Locomotive Driving-Wheels.

Will take wheels ranging from 45 to 100 inches diameter, and for cranks from 16 to 26 inches stroke.

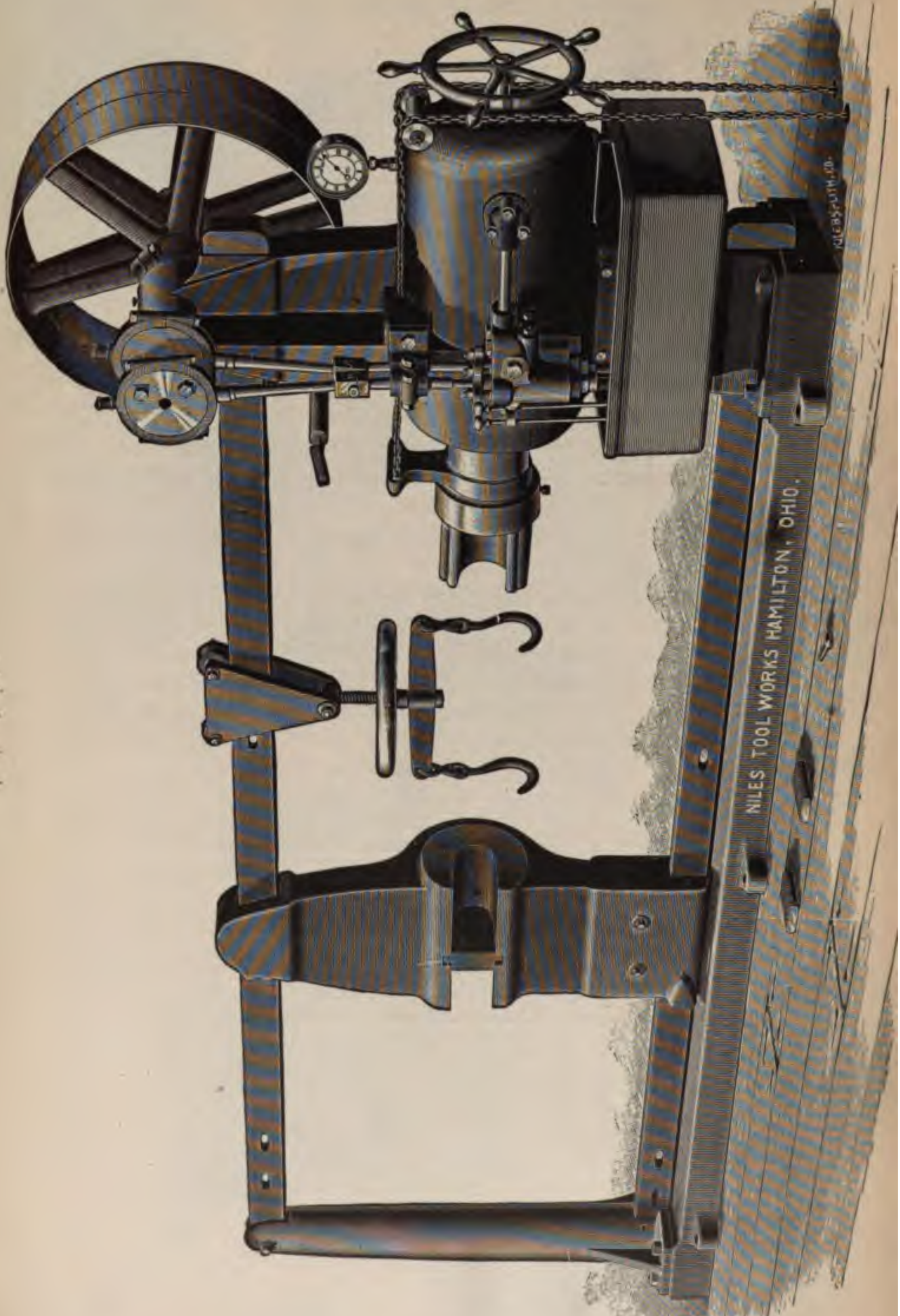
Both head-stocks have sliding spindles and centers for locating the wheels, and are adjustable on bed for length of axle.

Wheels are centered by the spindles, supported by the steady-rests and clamped on the rims. The boring-spindles are entirely independent, will bore for right or left-hand lead and have two feeds for roughing and one coarse feed for finishing. When once set the machine will accurately quarter the holes and locate the throw, so that no laying off is required on the wheels.

Counter-shaft has three pulleys, 24 inches diameter, for 3-inch belt. Speeds, 90 and 120 revolutions.

LIST OF SIZES.

Code Word.	Size of Machine.	Length of Bed.	Maximum Distance Between Centers.	Weight.	Price.
Malapari..........	72"	16'	8'	....	$........................
Malaptere..........	84"	16'	8'	....	$........................
Malaqueta..........	100"	16'	8'	....	$........................


NILES TOOL WORKS HAMILTON, OHIO.
KREBS LITH. CO.

HYDROSTATIC WHEEL PRESSES.

For Pressing on and off Car and Driving-Wheels.

The two resistance posts are held by two tie-bars, and are mounted on a cast-iron base, except the No. 1 which has no base. One post slides on the bars, and is firmly located in the required position by two cross-keys; the other post is bolted to the base, contains the copper-lined pressure-cylinder and carries the pumps, water tank, driving pulleys, gauge and safety-valve.

The standard machine stands at right angles to line shaft, but may be set parallel when specially ordered.

The double-plunger pump makes alternate strokes. One plunger is 1-inch diameter; the other, 1¾ inches diameter. They are entirely independent and are provided with a trip by which one or both may be instantly stopped by touching a handle. The small plunger is run for the final setting of the wheel or when the maximum power is desired for removal of wheels.

The pressure-gauge shows the pressure in pounds per square inch and total on ram in tons

The safety-valve is placed in a lock-box and weighted as desired.

The driving pulleys are 36 inches diameter for 6-inch belt, speed 100 revolutions, except the No. 1, which has pulleys 30 inches diameter for 4-inch belt.

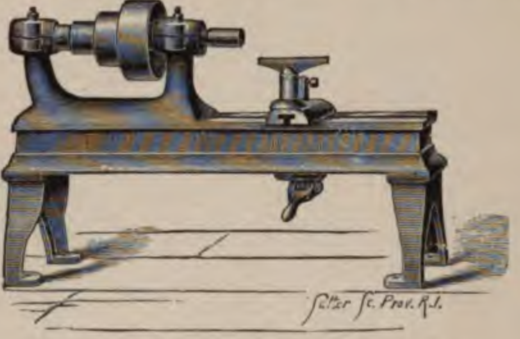
TABLE OF SIZES.

Code Word.	Size of Machine.	Maximum Distance Between Ram and Resistance Post.	Distance Between Tie-Bars.	Diameter of Ram.	Power in Tons.	Weight.	Price.
Malcontent	No. 1	8′ 4″	36″	8″	100	....	$................
Malediction.....	No. 2	8′ 4″	48″	9″	150	....	$................
Malefactor	No. 3	8′ 4″	66″	9″	150	....	$................
Malice	No. 4	8′ 4″	78″	9″	200	....	$................
Malicious	No. 5	8′ 4″	78″	11″	300	....	$................
Malicorium	No. 6	8′ 4″	84″	11″	300	....	$................

PART II.

LATHES.

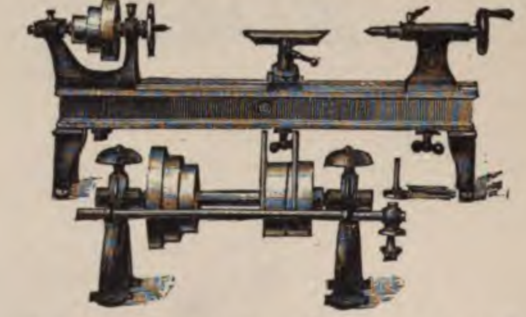
JEWELERS' POLISHING LATHE.


Salter Sc. Prov. R.I.

SPECIFICATIONS.

Code Word.	Swing.	Bed.	Hole in Spindle.	Countershaft.			Weight Complete.	Price Complete.
				Diam. Pulleys	Face.	Revs.		
Flywort	9″	2′ 0″	7-16″	5″	2⅝″	500	100 lbs	$25 00

SPEED LATHE.

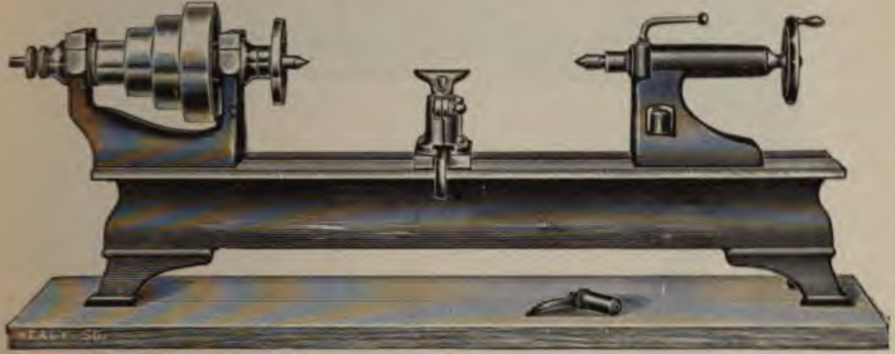


This Lathe was designed to supply the demand for an extra fine built small Lathe. They are fitted with patent, hard, open-grain, cast-iron taper-shell bearings, running in gun-metal box in front. The back end of steel spindle is tapering and hardened, and is fitted to an independent, adjusting cast-iron step. For fine adjustment this step is fitted with a screw separated from the spindle by two buttons, made of steel and hardened. They can be run at a high speed without heating.

SPECIFICATIONS.

Code Word.	Swing.	Bed.	Hole in Spindle.	Takes Between Centers.	Countershaft			Weight.	Price Complete.
					Diam. Pulleys	Face	Revs.		
Focador.	9″	2′ 0″	5-16″	16″	5″	1¾″		100lbs	$ 25 00

10-INCH and 11-INCH-SWING BENCH LATHE.



The head spindle is of cast crucible steel running in phosphor-bronze boxes, well scraped to a fit, and takes a No. 2 Morse taper for centers. Head cone, which is perfectly balanced, has four sections and takes 1½-inch belt.

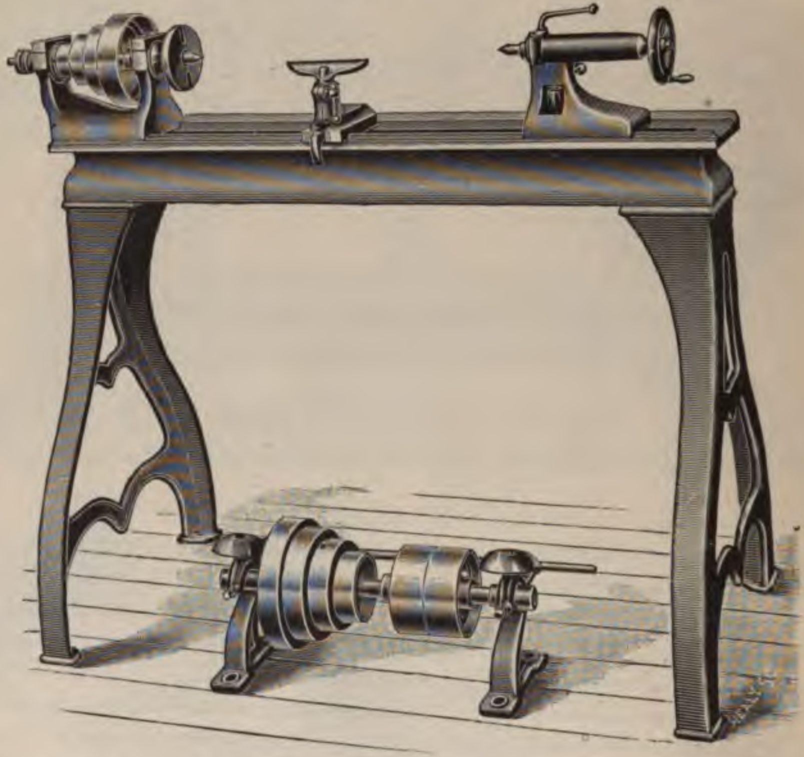
Tail spindle is of cast crucible steel 1⅛-inch in diameter, with a travel of 3⅞ inches. Tail binder operates from top of bed. Either screw or lever feed can be furnished at same price. Combined screw and lever feed can be put on if desired at extra cost.

T-Rest is securely fastened to bed by a cam movement operated in front and on top of the bed. A slide rest can be furnished to fit this rest when desired at an extra charge.

SPECIFICATIONS.

Code Word.	Swing.	Bed.	Takes Between Centers.	Hole in Spindle.	Countershaft.			Weight.	Price.
					Diam. Pulleys	Face.	Revs.		
Focalis	10″	40″	22″	9-16″	6″	2¼″	325	212 lbs	$ .. ..
Focaneos	10″	4′	30″	9 16″	6″	2¼″	325	232 lbs	$ ....
Focaribus	11″	4′	30″	9-16″	6″	2¼″	325	247 lbs	$ ....

10-INCH AND 11-INCH-SWING SPEED LATHE.

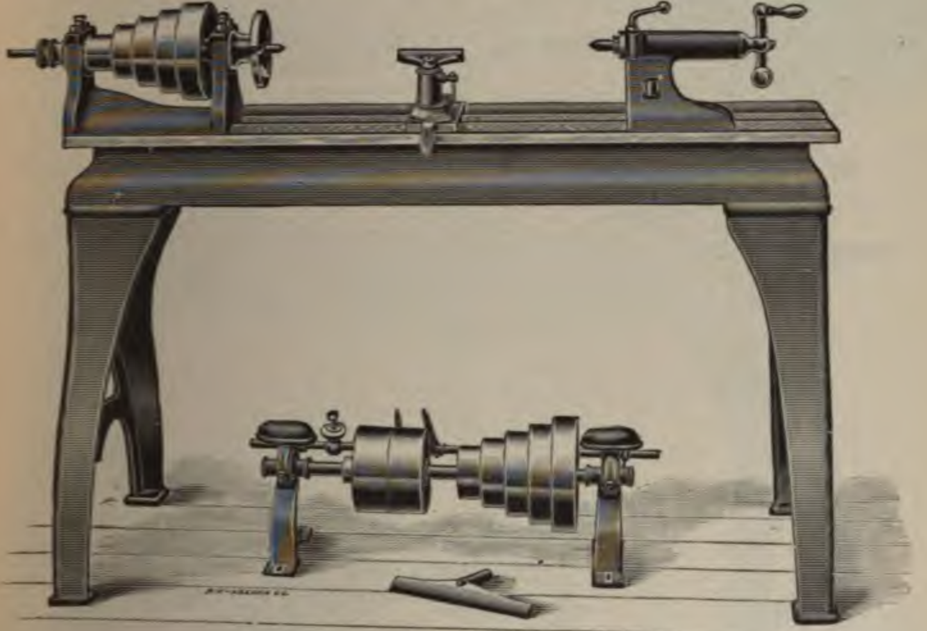


The Lathe is furnished with countershaft, 2 Ts for rest, and a plunger for driving center in head. The Speed Lathe is provided with a hard-wood tool-shelf, which is fastened to the back of the bed on iron brackets, and is very convenient for holding tools, work, etc.

SPECIFICATIONS.

Code Word.	Swing.	Bed.	Takes Between Centers.	Hole in Spindle.	Countershaft.			Weight.	Price.
					Diam. Pulleys.	Face.	Rev.		
Focarone	10″	40″	22″	9-16″	6″	2¼″	325	292 lbs	$............
Focattola ...	10″	4′	30″	9-16″	6″	2¼″	325	307 lbs	$. ....
Focena	11″	4′	30″	9-16″	6″	2¼″	325	330 lbs	$............

12-INCH AND 14-INCH-SWING SPEED LATHE.



This lathe has cast crucible steel spindles running in the best phosphor-bronze boxes, well scraped to a fit, and takes No. 2 Morse taper for centers. Cone is turned inside as well as out to secure a perfect balance, and has five sections taking a 1¾-inch belt.

Tail spindle is 1¼ inches in diameter and has a travel of 4¾ inches. Lever feed can be furnished on tail in place of screw feed without extra charge.

A slide rest can be furnished extra, when desired.

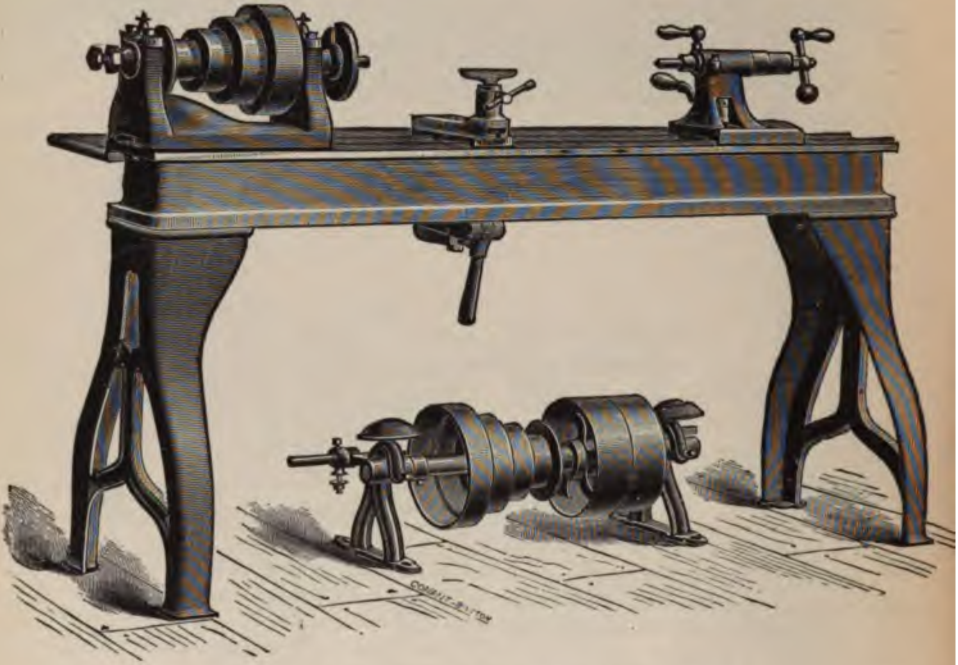
Besides countershaft this lathe is provided with two Ts for rest, and a plunger for driving center in head; also a hard-wood tool-shelf, which is securely fastened to the back of the bed on iron brackets.

Beds of any desired length.

SPECIFICATIONS.

Code Word.	Swing.	Bed.	Takes Between Centers.	Hole in Spindle.	Countershaft.			Weight.	Price.
					Diam. Pulleys.	Face.	Rev.		
Focenina...	12″	5′	34″	9-16″	7″	3″	250	500 lbs	$............
Focherello	14″	6′	46″	9-16″	7″	3″	250	600 lbs	$............

HAND LATHE, 14-INCH-SWING.

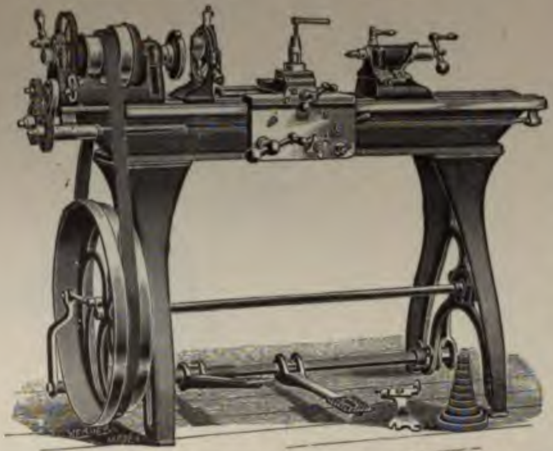


On the back of this lathe is a very good size shelf for holding tools. Solid Rest, 14-inch swing, 15 inches feed, can be furnished.

SPECIFICATIONS.

Code Word.	Swing.	Bed	Takes Between Centers.	Hole in Spindle.	Countershaft.			Weight.	Price.
					Diam. Pulleys.	Face.	Rev.		
Focillus	14″	6′	3′ 10″	11-16″	8″	3	200	700 lbs	$............

SCREW-CUTTING ENGINE LATHE, WITH AUTOMATIC CROSS-FEED, ETC., FOR FOOT OR STEAM POWER.



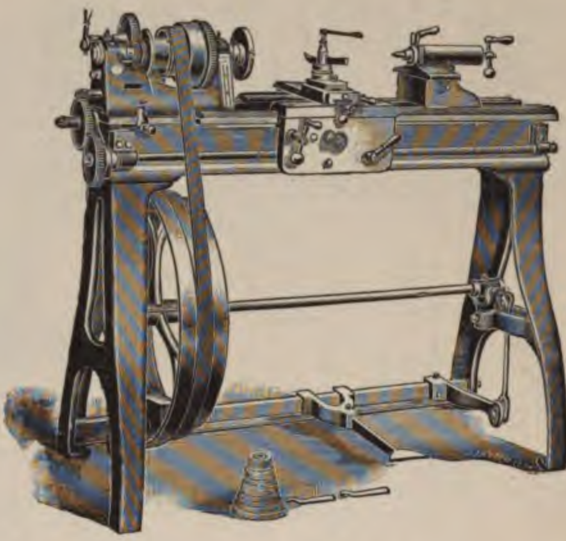
DESCRIPTION.

HEAD. Hole through spindle, 17-32-in. Bearings, phosphor bronze; cone, 3 steps, for 1¼-in. belt. REST. Plain gib rest; compound rest, extra attachment; tool-post provided with improved collar and shoe for raising and lowering tool; gibbed carriage. FEED. Improved, automatic, friction cross and longitudinal feeds, actuated by phosphor bronze worm on splined lead-screw. The only wear on its threads is in screw cutting. Feed thrown in or out of contact, by simply turning hand knob in apron. Will feed in or out, right or left, or thrown out of gear entirely, by moving lever in head stock without changing motion of foot or driving power. Steel lead-screw, 12 pitch, U. S. Standard thread; provided with open-and-shut nut; thrown in or out of contact by means of cam-lever in apron. Special lead-screw (and gears) furnished for cutting metric threads at same price. FOOT POWER. With ours, operator can obtain more leverage and produce greater power with less fatigue than with any other kind in use. Double treadles, with walking motion; treadles movable and work independently of each other; connected at opposite ends of driving-wheel shaft in such manner as to produce strong, positive and continuous power. It is started or stopped instantly, and operated with both feet or one foot, as desired. IN GENERAL. Each lathe provided with center rest, follower rest, centers, full set of change gears and wrenches; and with counter-shaft, if desired, at same price.

SPECIFICATIONS.

Code Word.	Swing.		Distance Between Centres.	Length of Bed.	Diameter Hole in Spindle.	Cuts Threads From	Countershaft.			Weight.	Price.
	Over Bed.	Over Rest.					Diam. Friction Pulleys.	Face.	Revs.		
Fodatum.	9″	5⅛″	24″	44″	17-32″	3 to 64	6″	1½″	200	375 lbs	$............
Fodaturi..........	9″	5⅛″	36″	56″	17-32″	3 to 64	6″	1½″	200	410 lbs	$............
Fodaveris	11″	6⅜″	36″	61″	21-32″	3 to 64	8″	2″	200	600 lbs	$............
Fodavero..........	11″	6⅜″	48″	73″	21-33″	3 to 64	8″	2″	200	650 lbs	$............
Foddered.........	11″	6⅜″	60″	85″	21-31″	3 to 64	8″	2″	200	700 lbs	$............

SCREW-CUTTING ENGINE LATHE.



Thread on screw is not used in turning as there is a friction feed for that purpose.

The lathe is backgeared and has three steps on cone for 1½-inch belt. Cross-slide on carriage will square up work full swing of lathe.

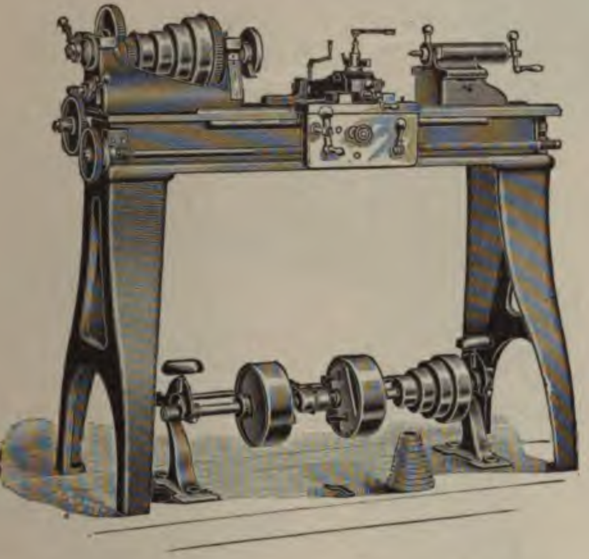
There is a reverse motion in head-stock which reverses the screw in screw cutting, preventing the necessity of stopping the balance wheel.

Feed rack for carriage is a cut steel rack. All gears are cut. Counter-shaft in place of foot power will be furnished when desired.

SPECIFICATIONS.

Code Word.	Swing.	Bed.	Distance Between Centers.	Cuts Threads per Inch.	Hole in Spindle.	Weight.	Price.
Foddering.	11″	4′	24″	4 to 40	9-16″	550 lbs	$.............

11-INCH ENGINE LATHE.



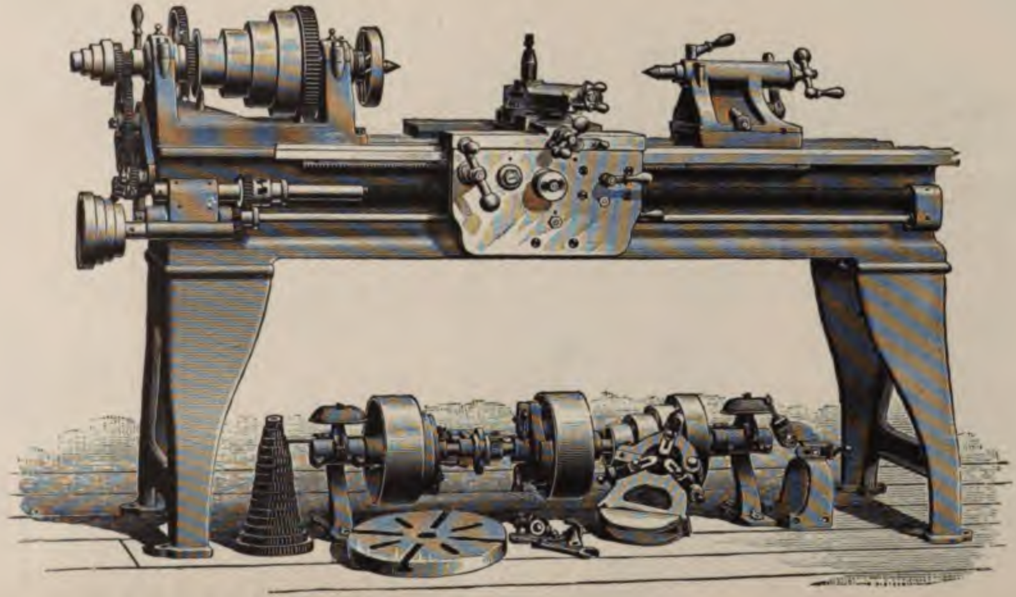
This cut represents an improved Engine Lathe with raise-and-fall gibbed rest.

This Lathe has a friction feed which is used in turning; by this arrangement the thread of screw is used only in screw cutting.

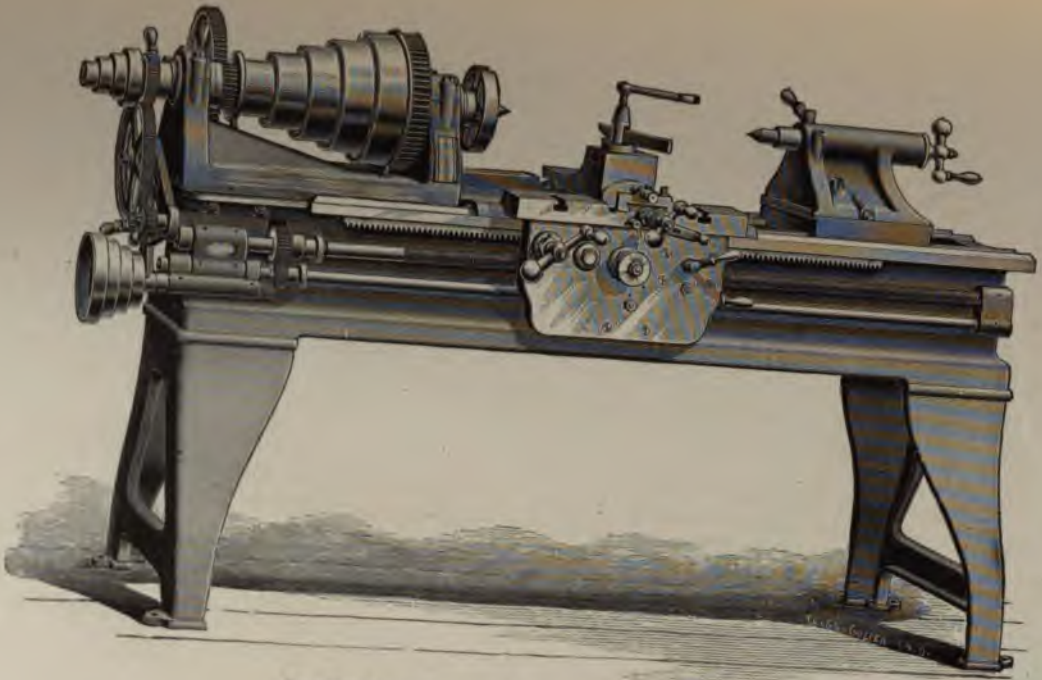
The Lathe can be furnished with plain gib or raise-and-fall rest, and with countershaft with tight-and-loose or friction pulleys.

GENERAL DIMENSIONS.

Swing of Lathe	11 inches.
Swing over plain gib rest	7 "
Swing over raise-and-fall rest	6 "
Length of Bed	4 feet.
Turns between centers	2 "
Length of Bed	5 "
Turns between centers	3 "
Hole through spindle	9-16 inches.
Number of steps on cones	4 "
Diameter of largest step	7 "
Face of cone sections	1 5-8 "
Diameter of Pulleys on countershaft	8 "
Revolutions of countershaft	225
Cuts threads from 4 to 36 and also 40.	
Weight of lathes, 4 ft. bed	600 pounds.
" " 5 "	650 "
Code Word 4 ft. bed	Foderammo.
" " 5 "	Fodaturam.



IMPROVED 14-INCH ENGINE LATHE.
For Description see Page 32.



IMPROVED 16-INCH ENGINE LATHE.
For Description see Page 32.

SCREW-CUTTING ENGINE LATHES.

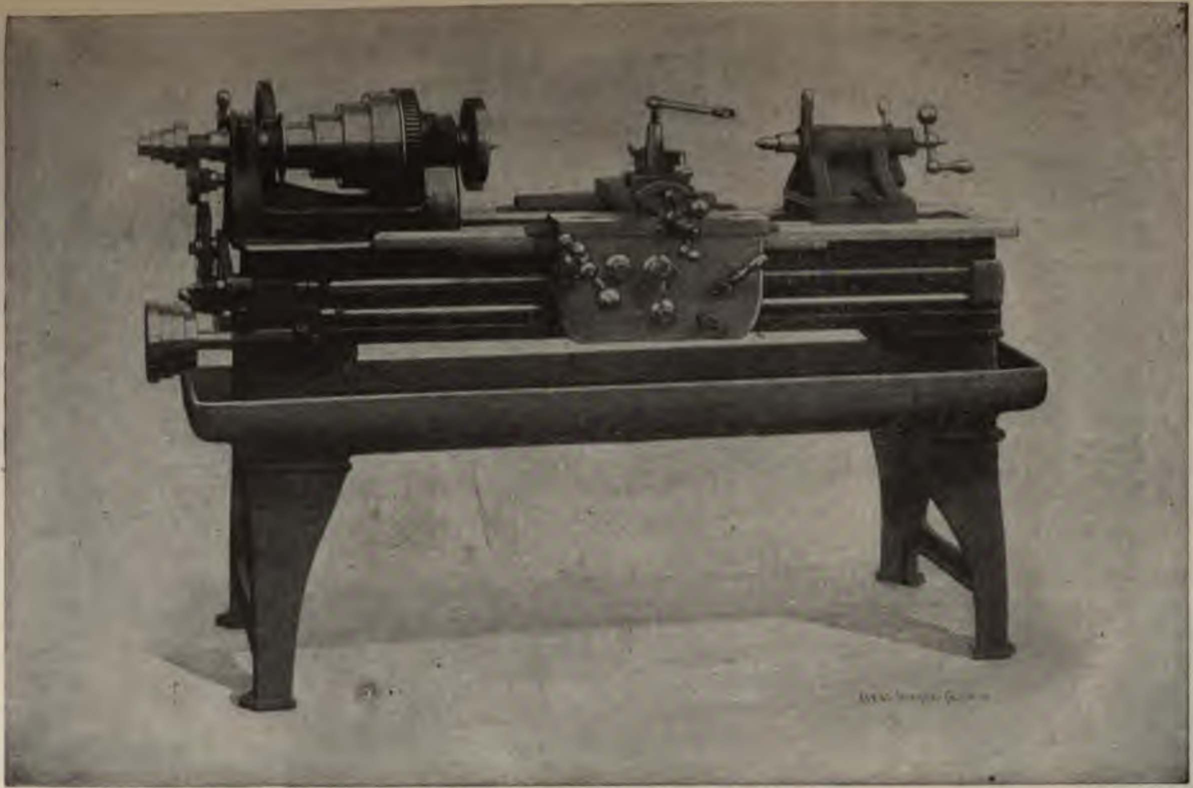
General Description.

These Lathes are modern in design and possess new and desirable features. Plain gib, raise-and-fall, or compound rest; taper attachment, and turret on carriage or bed are furnished as desired.

The spindles are ground and run in phosphor-bronze boxes, or, if desired, cast-iron, babbit lined. The carriages have long bearings and are protected from the chips. The tail-stock set-overs are graduated. All feeds are reversed in the apron and are graduated. Feeds are also arranged to reverse in the head when required. Large range of both belt and gear feeds. Rod and screw feeds cannot be thrown in at the same time. Length and cross feeds are automatic and graduated. The chasing stops are graduated to one-thousanth part of an inch, and can be set at zero in any position. The feed cones are on swinging brackets, and act as tighteners for the feed belts. All lathes are fitted with a dial on lead screws so that threads can be chased without stopping the lathe, or reversing the lead screw. The automatic feed stop furnished extra, when ordered, will throw out to a line and can be used with geared or belt feed. Large and small face-plates, follower and center rests, change gears, wrenches and countershaft are included. Countershafts have friction pulleys, can be oiled without throwing off the belt and can be set in any position on the shaft, as they run on self-oiling bushes.

DIMENSIONS.

Code Word.	Size	Swings.		Length of Bed	Takes Between Centers.	Range of Threads Per Inch	Morse Taper in Spindle.	Width of Belt on Cones.	Diameter of Hole in Spindle.	Countershaft.			Weight Boxed.	Weight each extra foot	Price.
		Over Bed.	Over Carriage.							Diameter Friction Pulleys.	Width of Face.	Rev.			
Foderassi	12″	13¼″	7¼″	5′	2′ 8″	5 to 40	No. 3	2″	13-16″	10″	3″	180	1250 lbs.	60 lbs.	$..........
Foderata	14″	15¼″	9⅝″	6′	3′ 8″	5 to 48	No. 3	2″	13-16″	10″	3″	170	1600 lbs.	85 lbs.	$..........
Foderolla	16″	17⅛″	11″	6′	3′	3 to 24	No. 3	2½″	$1\frac{1}{16}''$	10″—12″	3½″	150	2100 lbs	100 lbs.	$..........
Fodicant	18″	18½″	10″	6′	2′ 10″	2 to 20	No. 4	2¾″	$1\frac{9}{16}''$	12″	3½″	140	2600 lbs.	115 lbs.	$..........



12-INCH x 5-FOOT ENGINE LATHE—PAN-BED.

For Description see Page 34.

ENGINE LATHES, WITH PAN BEDS.

The lathe shown on previous page is very convenient where soda-water or oil is used.

It makes a very nice tool-room Lathe and is a comfort to a good hand, who likes to keep his floor clean and free from spots of oil or dirt. Its general features are similar to those of the lathes on page 30, 31 and 32.

SPECIFICATIONS.

Code Word.	Size.	Swings.		Length of Bed.	Takes Between Centres.	Range of Threads per inch.	Morse Tapers in Spindle.	Width of Belt on Cones.	Diameter Hole in Spindle.	Counter-shaft.			Price.
		Over Bed.	Over Carriage.							Diam. Friction Pulleys.	Width of face.	Revolutions.	
Fodavisses....	12"	13"	7¾"	5'	2' 8"	5 to 40	No. 3	2"	$\frac{13}{16}$"	10"	3"	180	$ ....
Foderando....	14"	15"	9⅝"	6'	3' 8"	5 to 48	No. 3	2"	$\frac{15}{16}$"	10"	3"	170	$ ....
Foderarla......	16"	17"	11"	6'	3'	3 to 24	No. 3	2½"	1$\frac{4}{16}$"	10 & 12"	3½"	150	$ ....
Foderarono..	18"	18½"	10"	6'	2' 10"	2 to 20	No. 4	2¾"	1$\frac{9}{16}$"	12"	3½"	140	$ ....

NILES LATHES.

General Description.

Our Lathes are built from new designs embodying the latest improvements, are fitted in the best possible manner to insure durability and all parts are calculated to withstand the heavy duty imposed by modern machine-shop practice. The surfaces are fitted by scraping (no emery being used) and all parts are made to U. S. Standard Gauges.

The BEDS are of very large section, strongly braced and cross-girted and the ways are of extra large proportions to give ample wearing surfaces.

The HEAD-STOCKS are made strong and rigid in form and are webbed entirely across under the cones both to insure stiffness and permit the use of as large driving cones as practicable. This form of construction gives the greatest amount of pulling power possible in the range of the swing.

The CONES bear their whole length on the spindle, are strongly back-geared and the ratio is calculated to give a regular gradation of speeds from the slowest to the fastest.

The SPINDLES are made of high carbon steel, large diameters, accurately ground and run in composition boxes. The boxes are carefully scraped to bearing by hand.

The TAIL-STOCKS have large spindles and are made to set over for taper turning. Lathes from 36 inches to 60-inches swing, inclusive, have rack-and-pinion motion for hand adjustment along the bed. On larger sizes they have separate holding bolts for the upper and lower slides so that the set-over can be adjusted without releasing the tail-stock from the bed.

The CARRIAGES are made very long, bear their entire length on the ways and are gibbed both front and back. The APRONS are firmly secured to the carriages and have large and long bearings for the gearing, thoroughly braced. The TOOL-RESTS are compound, graduated for angles and mounted so as to be removable, thus presenting the entire carriage surface for bolting work. This is an important feature in shops not supplied with regular boring machines.

On all sizes of Lathes the feeds are reversed in the aprons. A lock is provided so that the lead-screw nut and the apron feeds cannot be engaged at the same time. The feeds on Lathes above 32-inches swing are actuated by lead screw (without using the threads) through a short feed rod in the apron, eliminating all outside hangers for support of rod and giving steadier, smoother cutting feeds.

All lathes are provided with compound rests having power cross feeds ranging the entire width of the face-plate, steady and follower rests, face-plates, screw gearing, counter-shafts and wrenches.

Lead screws made for metric system, without additional cost, when desired.

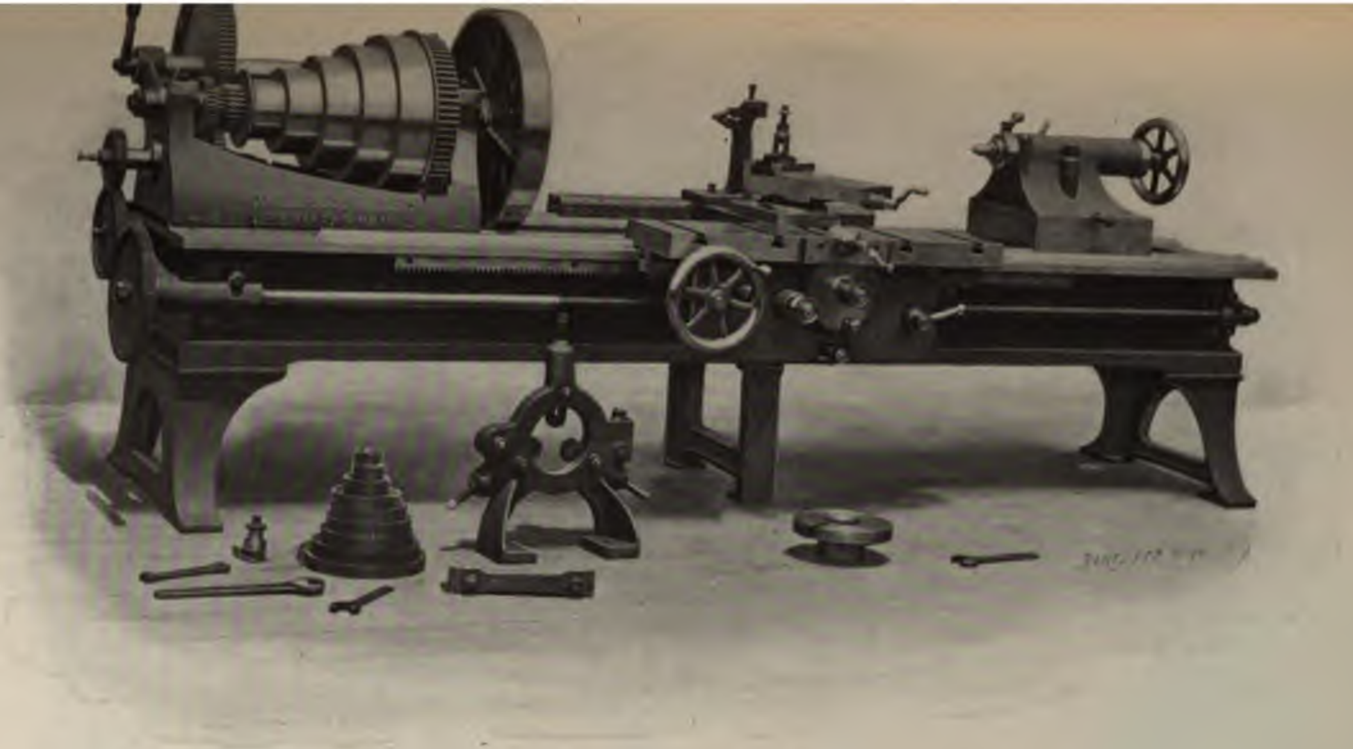
SPECIFICATIONS, ENGINE LATHES.

Code Word.	Swing.	Length of Bed.	Turns Between Centers	No. Steps on Cone.	Width of Cone Belt.	Counter Pulleys.				How Geared.	Weight.	Price.	Weight per extra Foot.	Price per extra Foot	Price Taper Attachment.
						Diam.	Face.	No. Revs. Forward.	No. Revs. Backward.						
Mangle.........	22"	8'	3' 3"	5	3"	20'	5¼"	85	125	Back	....	$	....	$......	$ ....
Manliness	4"	8'	3' 2"	5	3½"	20'	5¾"	85	125	"	....	$	....	$	$ ....
Maple	26"	10'	4' 4"	5	3½"	20'	7½"	85	125	"	....	$	....	$......	$ ....
Marline........	28"	10'	4' 4"	5	3½"	20'	7½"	85	125	"	....	$	....	$	$ ....
Marshland.....	30"	12'	6'	5	4"	20'	7½"	85	125	"	....	$	....	$......	$ ....
Masker	32"	12'	6'	5	4"	20'	7½"	85	125	"	....	$	....	$......	$ ....
Mate	36"	12'	5'	5	4"	22'	7½"	60	100	"	....	$	....	$......	$ ....
Mattress	38"	12'	5'	5	4"	22'	7½"	60	100	"	....	$	....	$......	$ ....
Mayoralty...	42"	14'	6' 8"	5	4"	26'	9"	90	125	Triple & into Face Plate.	....	$	....	$......	$ ....
Mealy	48"	14'	6'	5	4"	26'	9½"	75	125	"	....	$	....	$......	$ ....
Medicaster ...	54"	16'	8'	6	4"	22'	9½"	150	....	Back & into Face Plate.	....	$	....	$......	$ ....
Medley	60"	16'	7' 10"	5	4"	22'	8½"	150	225	Triple & into Face Plate	....	$	....	$......	$ ....
Melody	72"	16'	6'	5	5"	20' 28'	5½" 6½"	160	240	"	....	$	....	$......	$ ....

FORGE LATHES.

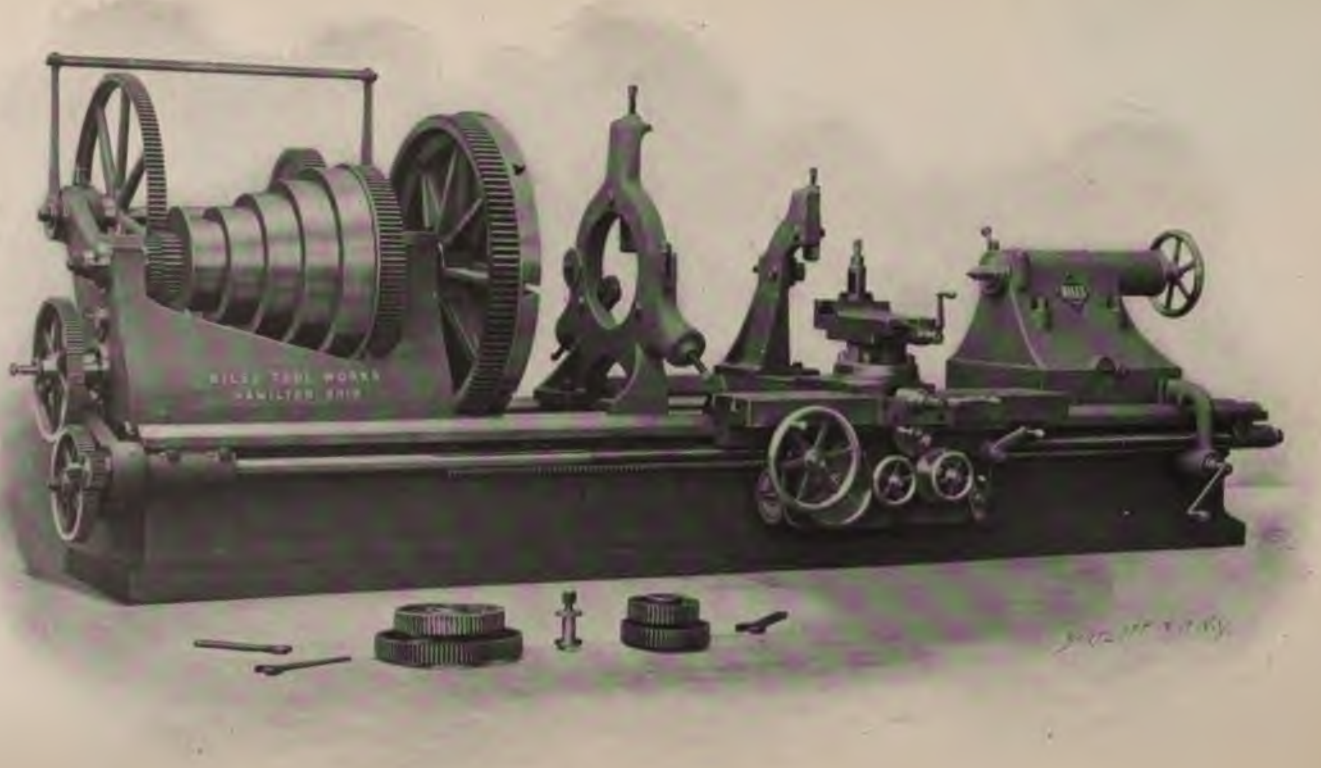
Code Word.	Swing.	Length of Bed.	Turns Between Centers	No. Steps on Cone.	Width of Cone Belt.	Diam.	Face.	No. Revs. Forward.	No. Revs. Backward.	How Geared.	Weight.	Price.	Weight per extra Foot.	Price per extra Foot	Price Taper Attachment.
Mergulus......	38"	12'	4' 4"	5	4"	22"	8¾"	110	160	Triple & into Face Plate.	....	$	....	$......	$ ....
Merlon	50"	16'	7'	6	4½"	22" 24"	6"	130	260	Back & into Face Plate.	....	$	....	$......	$ ....
Meteor	63"	16'	6'	5	4½"	24"	6"	100	150	Triple & into Face Plate.	....	$	....	$......	$ ....

We have patterns for, and are prepared to build, Extra Heavy Forge, Gun and Ingot Lathes up to and including a swing of 120 inches.



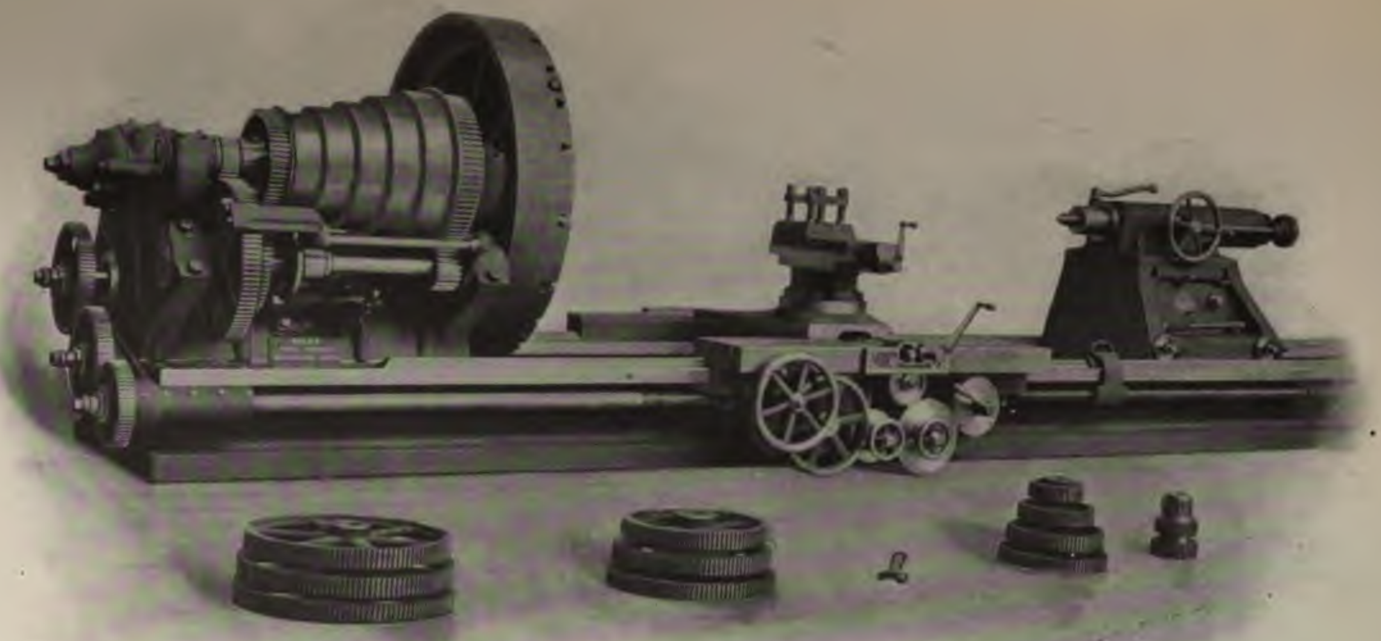
26-INCH ENGINE LATHE.

For Description and Specifications, see pages 35 and 36.



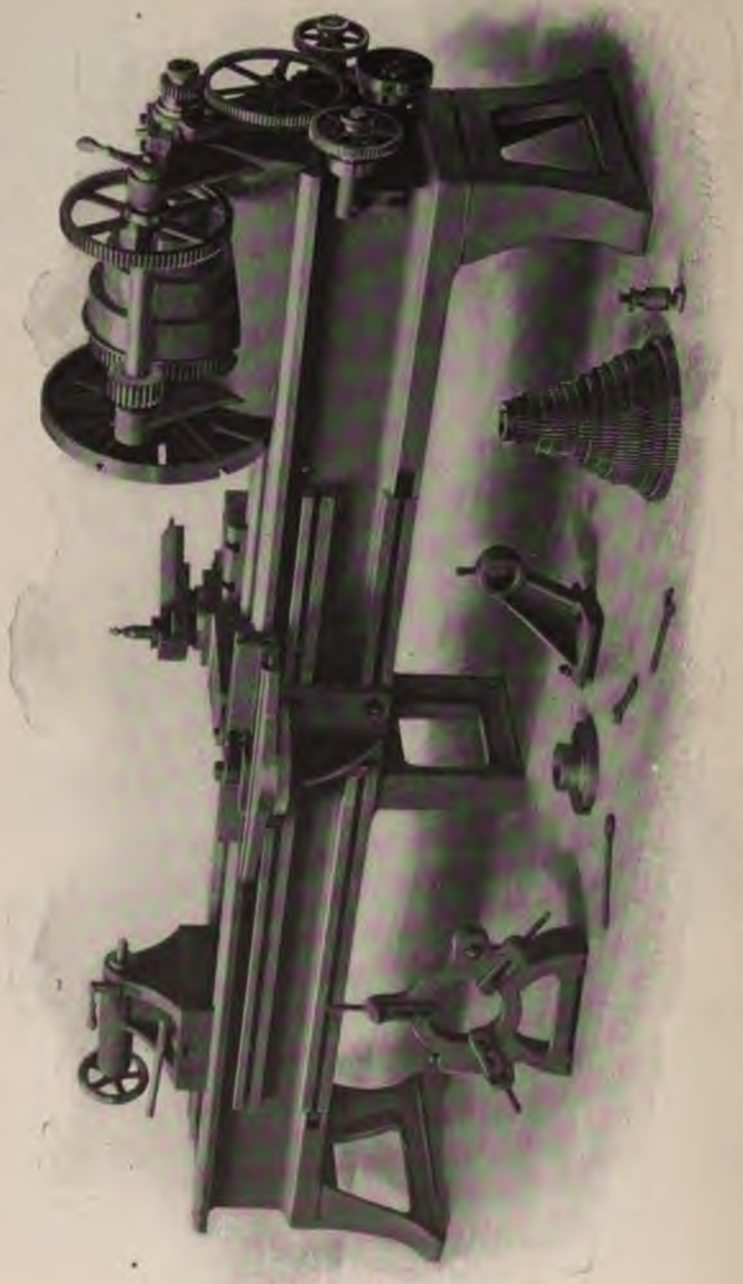
42-INCH ENGINE LATHE.

For Descriptions and Specifications, see pages 35 and 36.



63-INCH FORGE LATHE.

For description and specifications, sees page 35 and 36.



ENGINE LATHE, BACK VIEW, SHOWING TAPER ATTACHMENT.

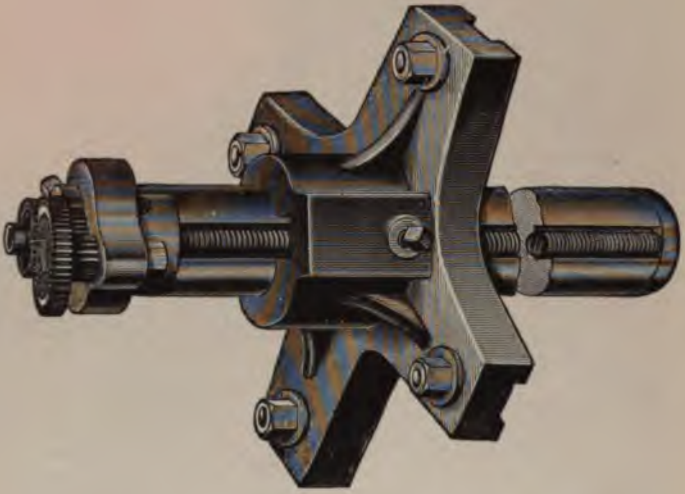
LATHE TAPER ATTACHMENTS.

Taper attachments consist of swiveling rail mounted on adjustable bracket at the back of bed. A block sliding in rail and attached to tool-rest gives the necessary taper.

The rail on the larger size lathes is supported rigidly by two additional brackets at the ends.

The attachment can be applied to any of our Lathes, when desired, at an additional cost.

Code word, Microbia.



BORING-BAR FOR LATHE.

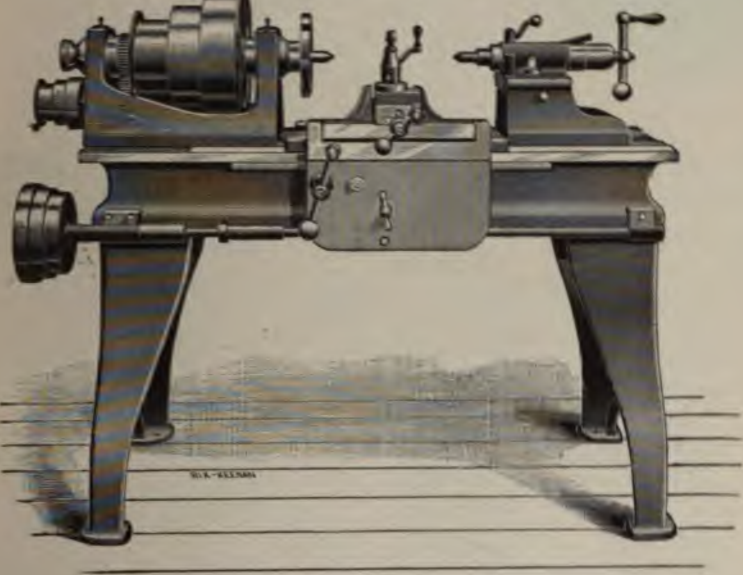
We build this bar any size required. It has hardened centres; automatic constant feed of cut gears, with steel feed-screw, being carefully fitted up with a bronze thrust-bearing, keeping out all lateral motion. We furnish suitable cutter-heads with our adjustable tool-holder. All bars accurately ground to gauge, and are first-class in every particular. Prices vary according to diameter and length of bars.

LIST OF SIZES.

Code Word.	Diameter Steel Bars.	Length.	Price.
Folhagem....................	4 inches.	6 feet, with 2 cutter-heads	$ ....
Folheho....................	4½ "	7 " " 2 " "	$ ....
Folhento	5 "	7 " " 2 " "	$ ....
Folhetaria	6 "	7 " " 2 " "	$ ....
		10 " " 2 " "	$ ....

STUD AND BOLT LATHE.

12 and 16-inch Swing.



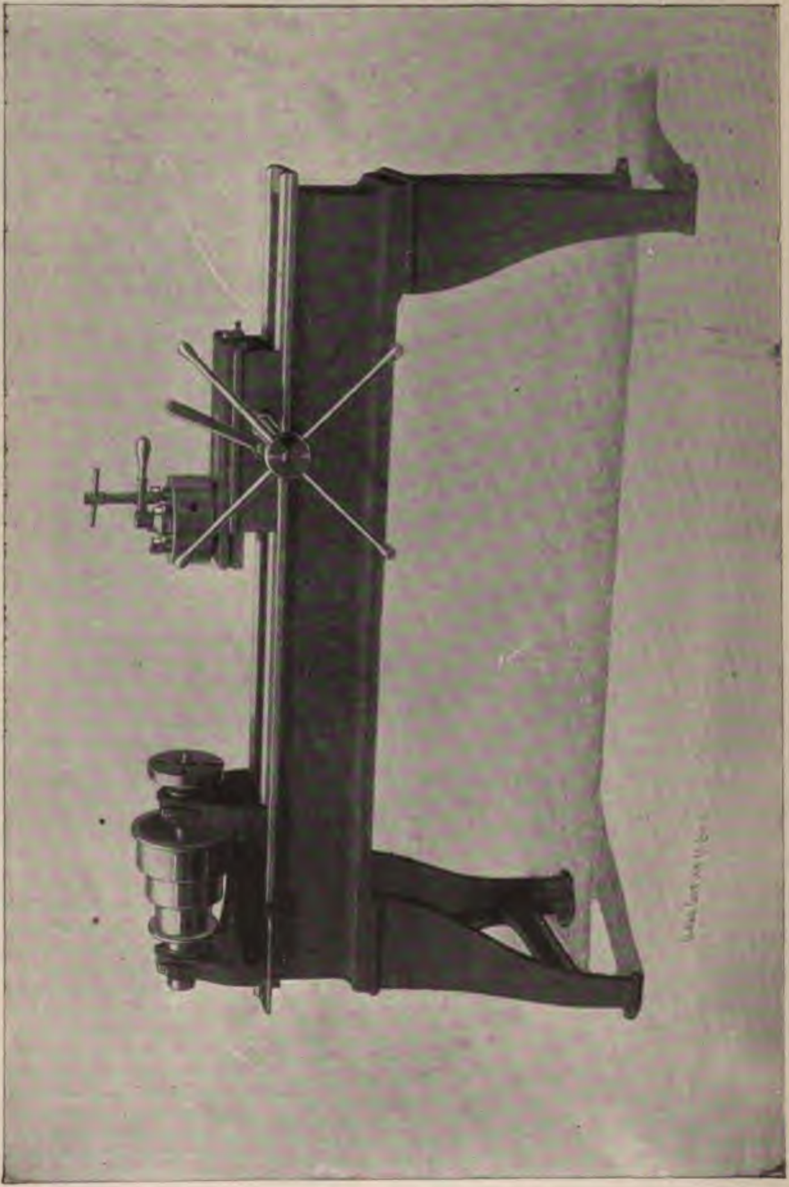
DESCRIPTION.

This tool is designed for turning short pieces to an exact length, or to a shoulder, and is especially adapted to turning studs and bolts. It has a hollow spindle. The feed is provided with an automatic stop motion, enabling the workman to turn any number of pieces to an exact length, or to operate two or more of the lathes. It has a large spindle running in bronze metal bearings. It is made without back gears or screw-cutting attachment.

This lathe is shown in illustration with raise-and-fall lock-gibbed rest. It can be furnished with plain rest and a screw-ring tool-post for raising and depressing the tool, if desired, and with any length of bed. It has a rod feed provided with a friction sufficiently strong to take any cut the power in the head can transmit. It has a balanced cone with three changes. The counter-shaft is provided with tight-and-loose pulleys.

SPECIFICATIONS.

Code Word.	Swings.		Length of Beds.	Distance Between Centers.	Hole in Spindle.	Counter-shaft.			Weight.	Price.
	Over Ways.	Over Rest.				Diam. Pulleys	Face.	Revs.		
Fodicet.. ...	12½''	6½''	4'	22''	⅝''	10''	3''	150	700 lbs	$..........
Fodiendos..	16''	7¾''	5'	24''	13/16'' or 1 3/16''	12''	3''	150	1200 lbs	$..........



PLAIN CHUCKING LATHE.

PLAIN CHUCKING LATHE.

These machines are made to perform a variety of operations without removing the piece from the chuck. The spindles are very heavy, and have a large hole through them, so as to work stock from the bar.

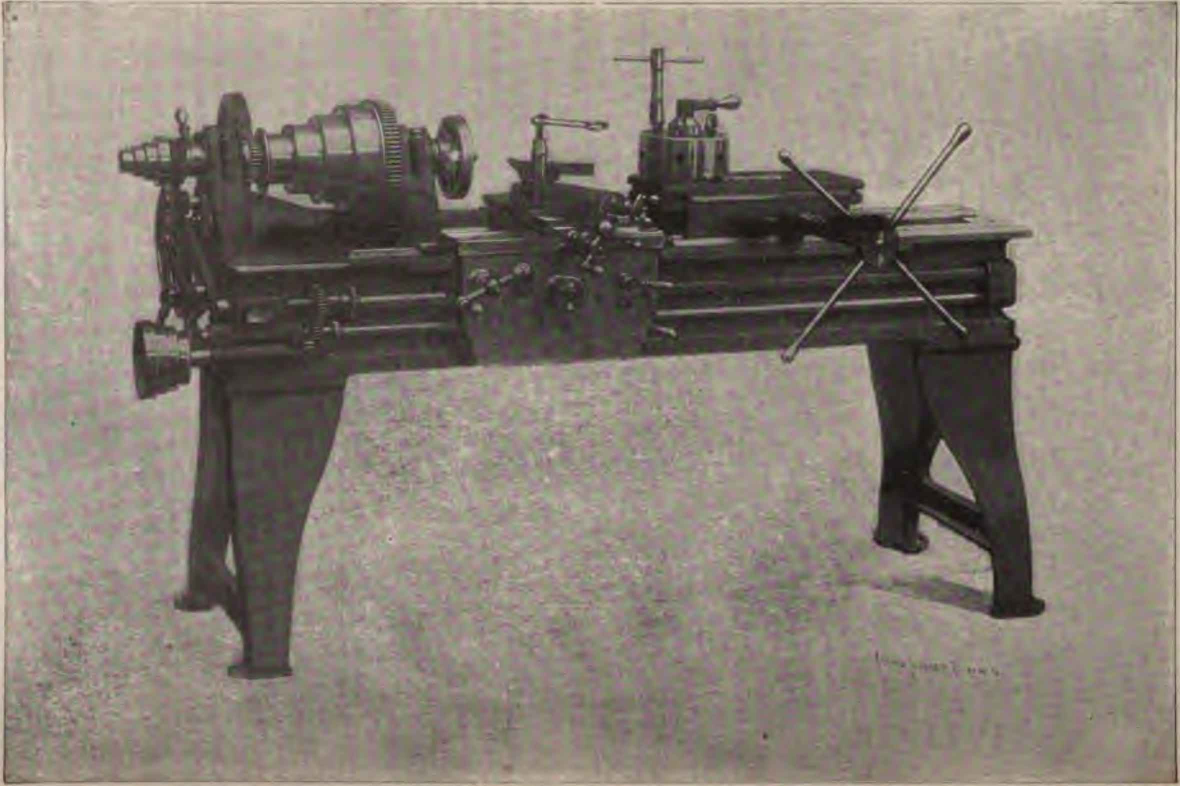
The end thrust is taken with ball bearings. The turrets are automatic, have six changes, and are made with or without power feed and automatic knock-off.

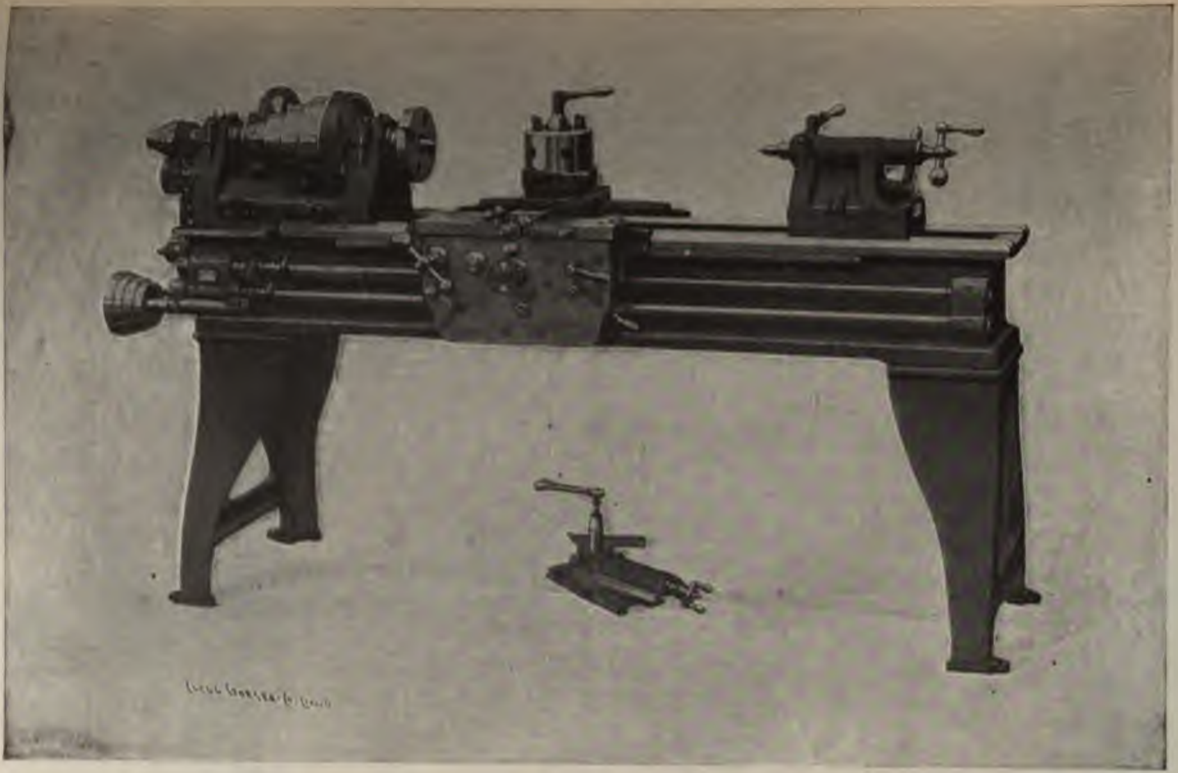
These Lathes are also made with friction head if desired.

They have double friction countershaft for two changes of speed.

SPECIFICATIONS.

	12 in. Swing.	14 in. Swing.	16 in. Swing.	18 in. Swing.
Diameter of hole in spindle	1 1/16"	1¼"	1½"	1¾"
Diameter of thread on spindle	2⅛"	2⅛"	2⅜"	2⅝"
Diameter of turret	7 "	8 "	9 "	10 "
Diameter of holes in turret	⅞"	1 "	1¼"	1¼"
Distance from center of holes to slide	1½"	1⅞"	2 "	2¼"
Length that can be milled	5½"	6½"	7½"	8½"
Length of bed	5'	6'	6'	6'
Largest diameter of cone	8 "	9 "	10½"	12 "
Width of belt	3 "	3 "	3½"	3½"
Diameter of pulley on countershaft	10 "	10 "	12 "	12 "
Speed of countershaft	225 rev.	200 rev.	180 rev.	170 rev.
Floor space	2½'x6'	2½'x7'	3'x7'	3'x7'
Weight	1100 lbs.	1400 lbs.	1700 lbs.	2000 lbs.
Code Word	Fognarono	Fognassimo	Fognerebbe	Fogneresti
Price	$	$	$	$ ....





ENGINE LATHE WITH TURRET ON CARRIAGE.

For Description see Page 48.

12 TO 18-INCH ENGINE LATHES, WITH TURRETS.

As shown on pages 46 and 47 the engine lathes described on page 32, can be supplied when desired, with turrets which are designed with as few parts as possible, so as to have the best wearing qualities.

These turrets are gibbed with square taper gibs, the locking-ring is large and is made of the best tool steel, hardened and ground, as is also the square locking-pin, which has a bearing in the slide on both sides of the ring.

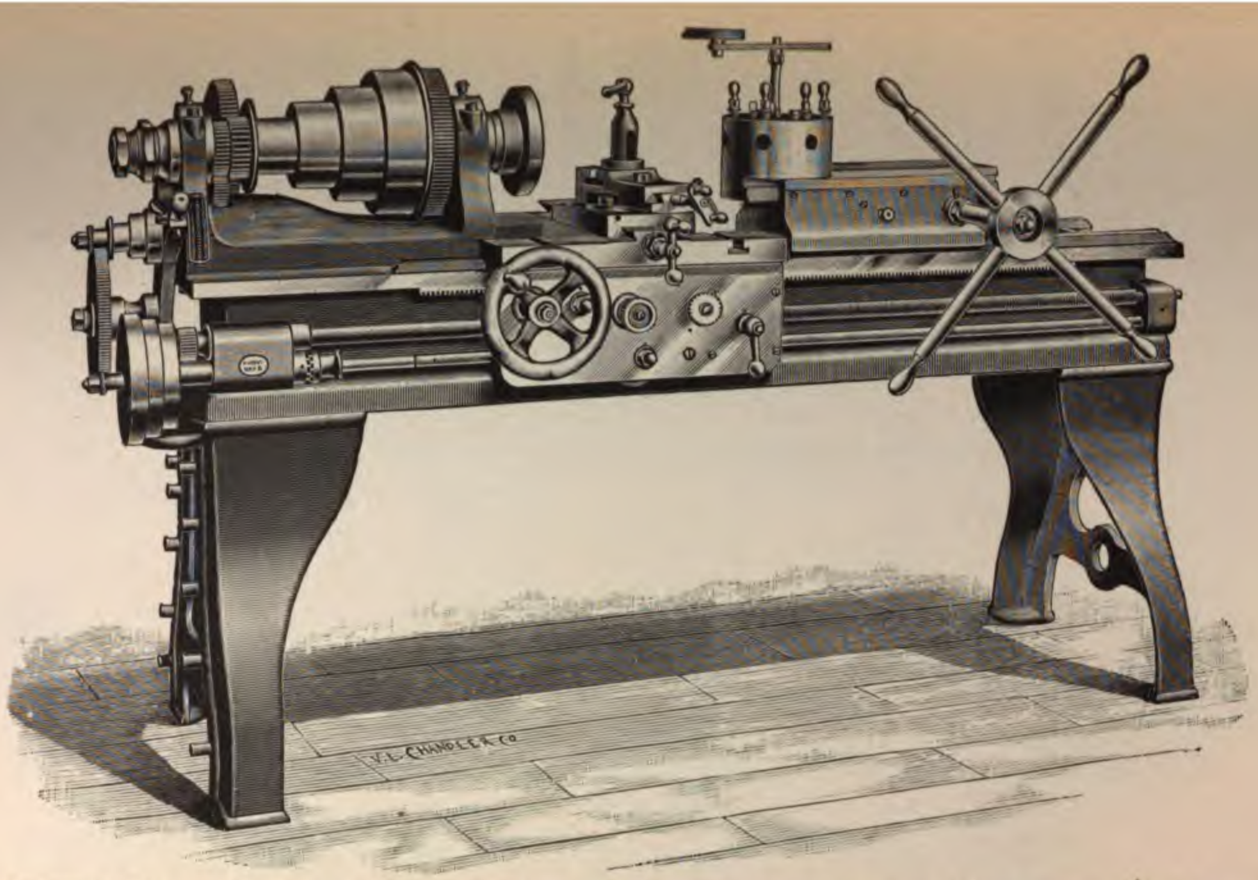
It is adjusted with a taper gib from the end of the slide.

The locking and revolving-ring are made in one piece, so there is no counter knocking strain to spring the turret. The turret is fitted with an adjustable taper center, and can always be kept tight on the revolving stud. The automatic feed can be tripped in both directions and can be thrown in instantly. The feed rod is fitted with a belt tightener.

These turrets can be fitted to any make of lathe by sending template of V's and height of center from V's.

SPECIFICATIONS.

	DIMENSIONS.			
	12 in.	14 in.	16 in	18 in.
Diameter of turret	7"	8"	9"	10"
Diameter of hole in turret	⅞"	1"	1¼"	1¼"
Number of holes in turret	6	6	6	6
Length that can be milled	5½"	6½"	8"	9"
Distance from center of holes in turret to top of slide	1½"	1⅞"	1⅞"	2¼"
Weight	175 lbs.	225 lbs.	300 lbs.	400 lbs.
Code Word	Foggettina	Foggiarla	Fogginess	Fogliatura
Price complete	$	$	$	$ ....



SCREW-CUTTING ENGINE LATHE, 16-INCH SWING, WITH TURRET AND COMPOUND REST, STYLE "E."

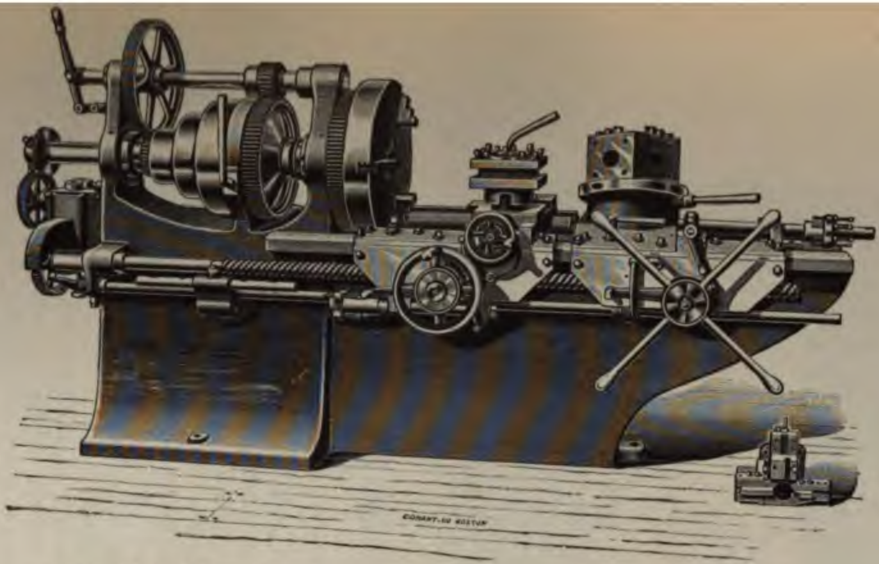
DESCRIPTION

Screw-Cutting Engine Lathes, Style "E."

These Lathes are well adapted for tool-room work, and for general manufacturing purposes requiring a high-class machine. Every part of the work on these Lathes is made in the most thorough manner. Each Lathe is run and carefully tested before it leaves the works. A patented device for varying the feeds is conveniently arranged. A new taper attachment combining desirable features can be furnished for these Lathes.

SPECIFICATIONS.

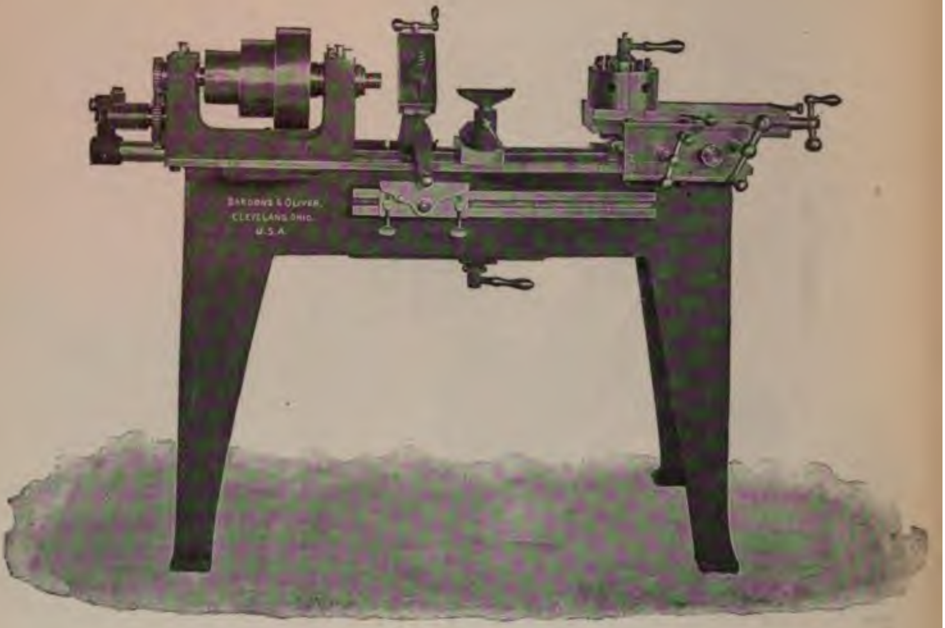
Code Word.	Swing.	Length Bed.	Turns.	Hole in Spindle.	Cone Belt.	Countershaft.			Prices.			
						Diam. Pulleys	Face.	Revs.	Lathe.	Per Extra Foot.	Taper Attach.	Turret.
Fodientis	14"	6'	3' 6"	¾"	2"	10"	3"	125	$	$......	$.....	$........
Fodientium	15"	6'	3' 4"	1⅛"	2¼"	10"	3"	130	$	$......	$.. ...	$........
Fodinarum.	16"	6'	3'	1¼"	2½"	12"	3½"	120	$	$.	$........	$........
Fodiremus..	18"	8'	4' 7"	1½"	2¾"	14"	4"	110	$	$........	$........	$........
Fofice...	20"	8'	4' 5"	1½"	3"	14"	4"	110	$	$........	$........	$........
Fofos	22"	12'	8'	1¾"	3¼"	16"	4"	90	$	$........	$........	$........



TRIPLE-GEARED TURRET LATHE WITH CARRIAGE. STYLE G.

SPECIFICATIONS.

Code Word.	Swings.			Face Plate to end of Gap.	Traverse of Turret.	Diam. in front Bearing.	Bore of Screw Mach. Spindle.	Bore of Turret Lathe Spindle.	Holes in Turret.	Diameters of Cone.			Width of Belt	Price.
	Over Ways.	Over Carriage	In Gap.											
Fokkesteng	13"	7 "	20"	5⅛"	34"	2¾"	1$\frac{5}{16}$"	1⅛"	1½"	5½"	8¼"	11 "	3 "	$ ....
Fokkezeil ...	21"	11¾"	30"	10⅛"	40"	3½"	2⅛"	1$\frac{11}{16}$"	2¼"	7½"	11¼"	15 "	3½"	$ ....
Folaghetta ..	24"	13⅞"	36"	11⅛"	44"	4¼"	2⅝"	2¼"	3 "	8¾"	13⅛"	17½"	4 "	$ ....
Folatrait	28"	15⅝"	42"	13⅛"	54"	5½"	3⅝"	3¼"	3½"	10 "	15 "	20 "	4½"	$ ....
Folatrons. ..	34"	19½"	50"	15¼"	54"	6½"	4⅝"	4¼"	4 "	12 "	18 "	24 "	6 "	$ ....



BRASS WORKERS' TURRET LATHES.

The Turret Lathes here shown are for brass workers and are especially designed for finishing parts which are threaded or for jobbing work where a comparatively small number of pieces of a kind are to be made at one time.

These machines are furnished with set-over turret slide and saddle in place of the regular slide and saddle, and have chasing attachment and hand rest in place of the regular cut-off rest.

The chasing attachment is very complete. The chasing bar has three bearings bolted to the rear of the bed, the middle bearing being adjustable so it can be moved along to accommodate itself to the position of the chasing arm.

Provision for cutting taper threads is made by means of the attachment shown on the front of bed. Reverse gearing is provided at the head end so that both right and left hand threads may be cut with only one set of leaders and followers.

The lock bolt is withdrawn by hand by means of a lever, and the turret revolved by hand in the usual way. Screw feed and rack and pinion feed are provided for the turret slide on all sizes except the No. 12 machine, where a screw feed and lever feed are furnished. The screw feed is obtained by means of a screw and half nut, the half nut being thrown in and out of mesh with the screw by the knob shown at the front of the saddle.

Stop screws with check nuts are provided for both longitudinal and cross feeds. Turret slide can be provided with swivel for boring taper holes if desired. Prices quoted an application.

A double friction countershaft is furnished with these machines, also the necessary spanners and wrenches. Three leaders and three followers are furnished without extra charge.

Dimensions, weights, etc. on page 53.

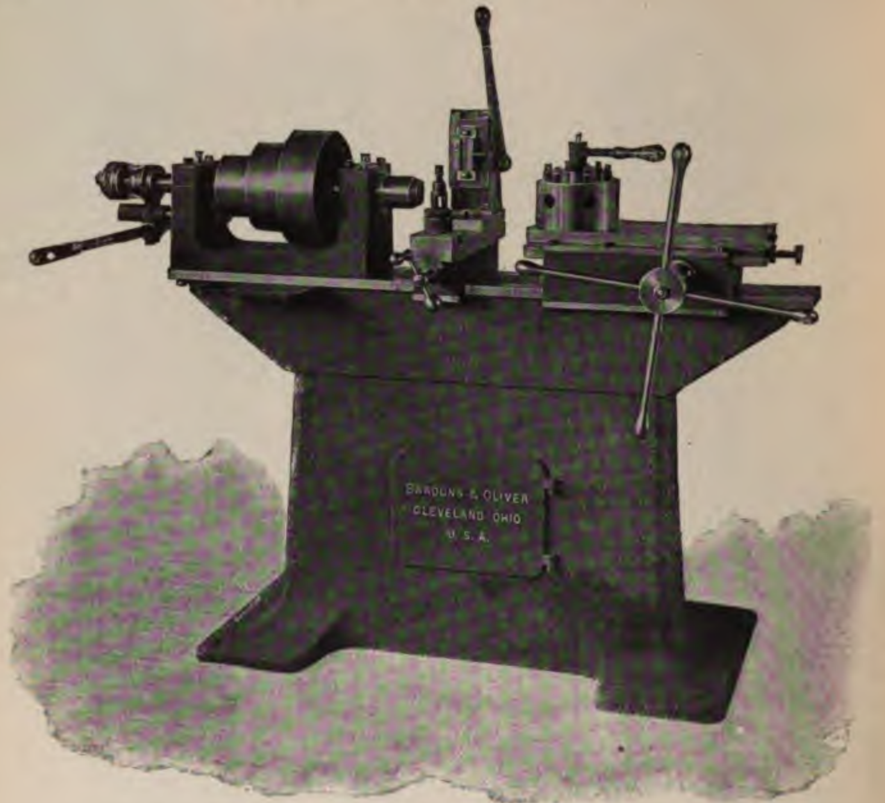
TURRET LATHES.

With plain or friction geared head, set-over slide and saddle, chasing attachment and hand-rest mounted on legs.

Principal dimensions, weights, etc.

Number of Machine. **Style of Machine.**	12 Plain.	13 Plain.	13 Geared.	14 Plain.	14 Geared.	15 Plain.	15 Geared.	15½ Geared.
Diameter of Hole in Spindle	1 1/16"	1 5/16"	1 5/16"	1 7/16"	1 7/16"	1⅞"	1⅞"	2¼"
Diameter of Thread on Spindle (Unless Otherwise Specified	1¾"	2¼"	2¼"	2¼"	2¼"	2⅞"	2⅞"	3½"
Pitch of Thread on Spindle (Unless Otherwise Specified)	10"	8"	8"	8"	8"	7"	7"	6"
Largest Diameter of Cone	9½"	10½"	10½"	12"	12"	13"	13"	13"
Width of Belt	2½"	3"	2½"	3½"	3"	4"	3½"	3½"
Diameter of Turret	6¼"	7⅜"	7⅜"	8⅝"	8⅝"	9⅜"	9⅜"	10½"
Diameter of Hole in Turret (Unless Otherwise Specified	1"	1¼"	1¼"	1½"	1½"	1½"	1½"	1¾"
Center of Holes in Turret to Top of Slide	1⅝"	2"	2"	2½"	2½"	2¾"	2¾"	3"
Longitudinal Motion of Slide	6½"	7½"	7½"	9"	9"	10"	10"	11"
Cross Motion of Slide	4¼"	3"	3"	4"	4"	5"	5"	6"
Swing Over Chasing Tool Slide	3¾"	4⅝"	4⅝"	5½"	5½"	6½"	6½"	8⅝"
Friction Pulleys on Countershaft	10x3¼"	12x3¾"	10x3½"	12x4¼"	12x3¾"	14x4⅜"	14x4⅜"	14x4⅞"
*Countershaft Speeds	360	280	340	260	325	240	300	280
Net Weight of Machine with Countershaft	850 ibs	1100 lbs.	1275 lbs.	1350 lbs.	1525 lbs.	1575 lbs.	1825 lbs.	1950 lbs.
Weight, Crated for Domestic Shipment	900 lbs.	1175 lbs.	1350 lbs.	1450 lbs.	1625 lbs.	1700 lbs.	1950 lbs.	2100 lbs.
Weight, Boxed for Foreign Shipment	1180 lbs.	1425 lbs.	1600 lbs.	1800 lbs.	1975 lbs.	2100 lbs.	2350 lbs.	2700 lbs.
Dimensions of Box for Foreign Shipment	58x26x42"	65x32x43"	65x32x43"	72x34x44"	72x34x44"	78x36x45"	78x36x45"	86x44x56"
Code Word for Complete Machine as Shown in Cut	Follentis	Folletage	Follezza	Follicant	Folliful	Follinorum	Folter	Folterende
Price for Complete Machine	$	$	$	$	$	$	$	$
Code Word for Set-over Slide and Saddle	Folleremus	Folletines	Follicabas	Follicola	Folligena	Follow	Folteraars	Foltering
Deduct for Set-over Slide and Saddle	$	$	$	$	$		$	$
Code Word for Chasing Attachment and Hand Rest	Follerete	Folletista	Follicabit	Follicular	Folligenis	Following	Folterbank	Folterpein
Deduct for Chasing Attachment and Hand Rest	$	$	$	$	$	$	$	$
Code Word for Cut off-Rest	Folleros	Folleto	Follicando	Folliculo	Follilho	Foltamente	Folterbett	Folterqual
Add for Cut-off Rest	$	$	$	$	$	$	$	$

*Countershaft speeds given are for brass or other soft stock.



BRASS WORKERS' TURRET LATHES

The Turret Lathes here shown are specially designed for brass workers, for finishing irregular shapes in brass or other soft metals. These machines are furnished with vertical forming tool slide in place of the regular cut-off, and have automatic chuck.

The vertical forming tool slide is somewhat similar in design to the cut-off, having a saddle and cross slide which is operated by a screw, but is built much heavier. On the rear end of the slide is a knee, on which a vertical slide moves, carrying the forming tool. The distinctive feature of this device is the fact that the forming tool is vertical instead of horizontal. This vertical construction overcomes many of the objectionable features found in the horizontal or usual construction. It permits of large diameters being operated upon, is easily adjusted and allows of a second light cut being taken on a piece without disturbing the adjustment and losing the size, a feature obtained with this construction only.

The automatic chuck furnished for these machines is operated by a lever on the small sizes, and by a rack and pinion with turnstile on the large sizes; the turnstile being placed at the front end of the head, within easy reach of the operator. By means of the automatic chuck the pieces to be formed can be placed in the chuck the chuck closed and the piece finished and removed from the chuck without stopping the machine.

These machines can be furnished with either plain, plain back geared or friction geared heads. Extra large spindles can be supplied when desired. Can be furnished mounted on legs if preferred.

Dimensions, weights, etc. on page 55.

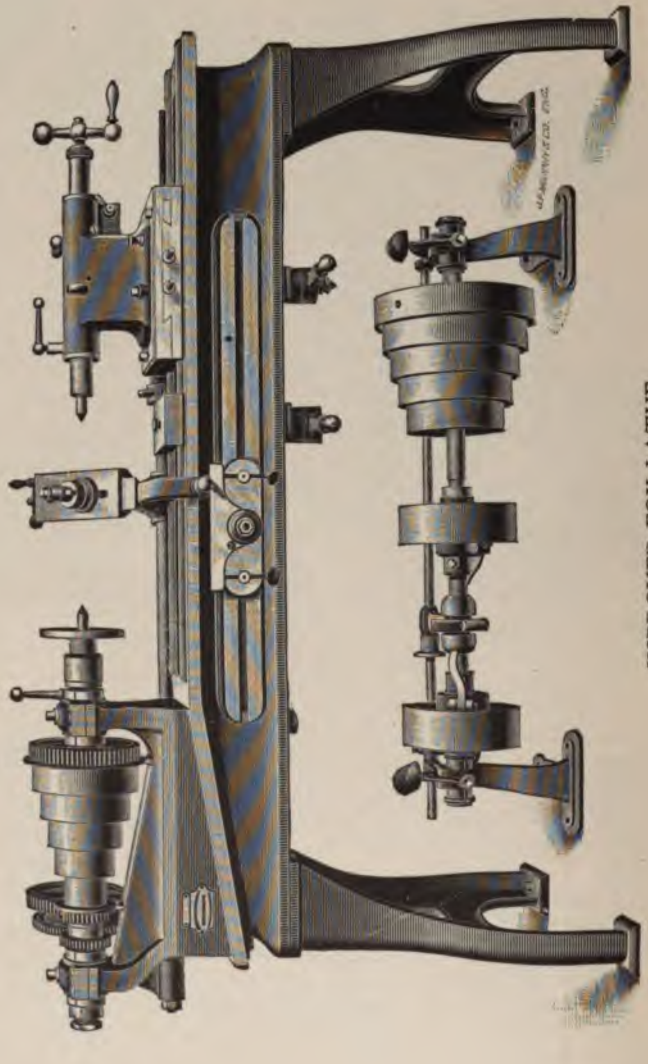
TURRET LATHES.

With plain or friction geared head, automatic chuck and vertical forming tool slide mounted on column.

Principal dimensions, weights, etc.

Number of Machine. Style of Machine. Capacity of Automatic Chuck.	12 Plain. ¾"	13 Plain. 1"	13 Geared. 1"	14 Plain. 1⅛"	14 Geared. 1⅛"	15 Plain 1½"	15 Geared. 1½"	15½ Geared. 1¾"
Diam. of Hole in Spindle	1 1/16"	1 5/16"	1 5/16"	1 7/16"	1 7/16"	1⅞"	1⅞"	2¼"
Diam. of Hole in Chuck Plunger	13/16"	1 1/32"	1 1/32"	1 5/32"	1 5/32"	1 9/16"	1 9/16"	1 13/16"
Diam. of Thread on Spindle (Unless Otherwise Specified)	1¾"	2¼"	2¼"	2¼"	2¼"	2⅞"	2⅞"	3½"
Pitch of Thread on Spindle (Unless Otherwise Specified)	10"	8"	8"	8"	8"	7"	7"	6"
Largest Diameter of Cone	9⅛"	10⅜"	10⅜"	12"	12"	13"	13"	13"
Width of Belt	2½"	3"	2½"	3½"	3"	4"	3½"	3½"
Diameter of Turret	6¼"	7⅜"	7⅜"	8⅝"	8⅝"	9⅜	9⅞"	10½"
Diam of Holes in Turret (Unless Otherwise Specified	1"	1¼"	1¼"	1½"	1½"	1½"	1½"	1¾"
Center of Holes in Turret to Top of Slide	1⅜"	2"	2"	2½"	2½"	2¾"	2¾"	3"
Motion to Turret Slide	5"	6¼'	6¼"	7¼"	8"	9"	9"	10"
Diam of Largest Piece that can be Formed	3"	4"	4"	5½"	5¼"	6"	6½"	6½"
Friction Pulleys on Countershaft	10x3¼"	12x3¼"	10x3½"	12x4¼"	12x3¾"	14x4⅜"	14x4⅜"	14x4⅞"
*Countershaft Speeds	300	280	340	260	325	240	300	280
Net Weight of Machine with Countershaft	850 lbs.	1100 lbs.	1240 lbs.	1350 lbs.	1550 lbs.	1575 lbs.	1825 lbs.	2125 lbs.
Weight, Crated	900 lbs.	1175 lbs.	1315 lbs	1450 lbs	1650 lbs.	1700 lbs	1950 lbs.	2275 lbs.
Weight, Boxed for Export	1180 lbs.	1425 lbs.	1505 lbs	1800 lbs.	1950 lbs.	2100 lbs.	2350 lbs.	2875 lbs.
Boxed Dimensions	50x27x42"	60x32x43"	60x32x43"	72x34x44'	72x34x44	80x36x45"	80x36x45"	90x44x45"
Code Word for Complete Machine as Shown in Cut	Folyoca	Fomentammo	Fomentava.	Fomentons...	Fonaciones	Fondamento	Fondeerde.	Fonfarao....
Price for Complete Machine	$	$		$	$	$	$	$
Code Word for Automatic Chuck	Fomalhaut...	Fomentarala	Fomenter	Fomentorum	Fonalidad.	Fondatrice....	Fondrilles.	Fongueux...
Deduct for Automatic Chuck	$	$	$	$	$	$	$	$
Code Word for Vertical Forming Tool Slide	Fomentaban.	Fomentassi.	Fomenting.	Romitem	Fonceau..	Fondeabais	Fonebol.....	Fonkelende
Deduct for Vertical Forming Tool Slide	$	$	$	$	$	$	$	$
Code Word for Cut off Rest	Fomentacao	Fomentato...	Fomentolla	Fonacion	Fondacaio...	Fondeadero...	Foneticbe.	Foreasmuch
Add for Cut off Rest	$		$	$	$	$	$	$

*Countershaft speeds are for brass or other soft stocks.



IMPROVED FOX LATHE

IMPROVED FOX LATHE.

The cut on page 56 represents an improved Brass Finisher's Lathe, built from entirely new patterns, and designed for use on brass work of every description. By means of the inclined plane, the headstock can almost instantly be raised and lowered, as may be required, to a height to agree with that of the tailstock. This feature is a desired one and will be appreciated by all who are aiming to do their work well and rapidly. The live spindle is made of special steel which is very hard and close grained.

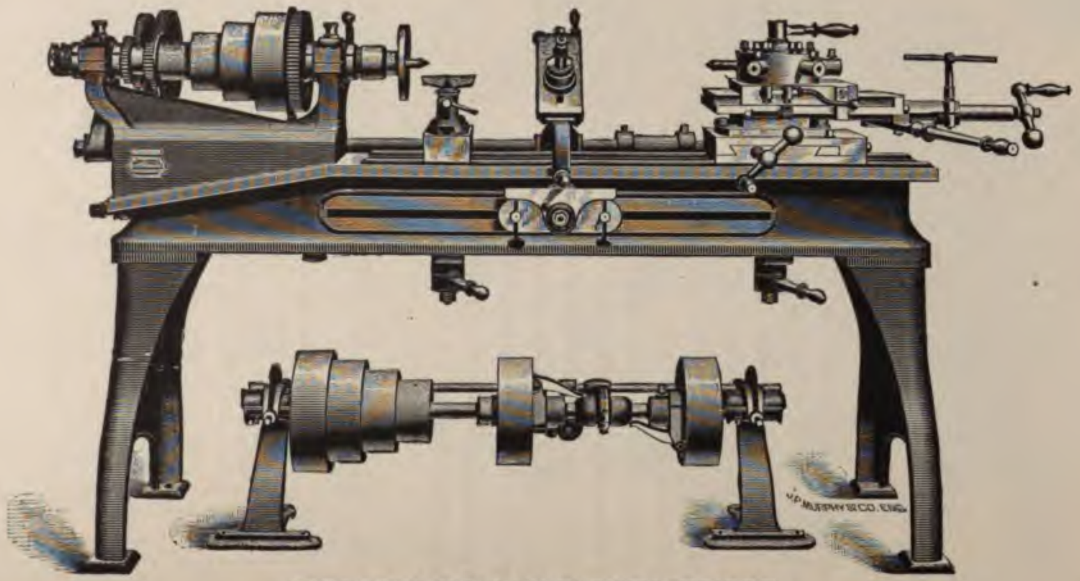
The journals are large and run in self-oiling bronze boxes that are fitted with arrangement for adjusting, by which the spindle can be kept to a perfect running fit, and all held so rigidly that shaking is impossible. The principal objection to hollow-spindle lathes has been overcome by providing a thrust-bearing that continually runs in oil, and thus the spindle is relieved of the great friction and wear it has heretofore been subjected to.

Furnished with hollow spindle; screw apparatus; taper attachment. swivel, back motion dove-tail set-over and overhead works.

No. 1 IMPROVED LATHE SPECIFICATIONS.

Code Word.	Swing.	Length Bed.	Hole in Spindle	Cone Belt.	Countershaft			Weight.	Price
					Diam. Pulleys	Face	Rev.		
Foldnet	17"	6'	1⅛"	2¼"	10"	3"	150	1300lbs	$ ....

Floor Space 78"x28".


J.P. MURPHY & CO. ENG.

IMPROVED FOX LATHE WITH TURRET

IMPROVED FOX LATHE.

A recent production in Lathes for Brass and Iron Workers' use is represented by this cut, and we call attention to the improvements described below. By means of the inclined plane, the headstock can almost instantly, be raised and lowered, as may be required, to a height to agree with that of the tailstock. The live spindle is made of special steel which is very hard and close grained.

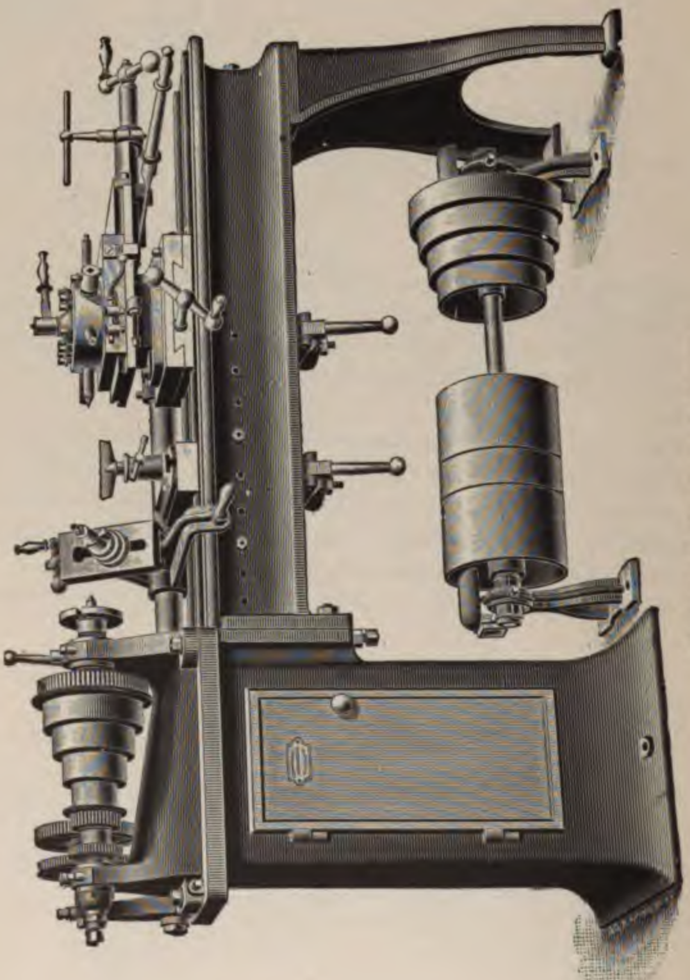
The journals are large and run in self-oiling bronze boxes that are fitted with arrangement for adjusting, by which the spindle can be kept to a perfect running fit, and all held so rigidly that shaking is impossible. The principal objection to hollow-spindle lathes has been overcome by providing a thrust-bearing that continually runs in oil, and thus the spindle is relieved of the great friction and wear it has heretofore been subjected to.

Furnished with hollow spindle; back gears; screw apparatus; taper attachment and overhead works.

No. 2 IMPROVED TURRET LATHE SPECIFICATIONS.

Code Word.	Swing.	Length Bed.	Hole in Spindle.	Cone Belt.	Countershaft.			Weight	Price.
					Diam. Pulleys	Face.	Rev.		
Folette	18"	6'	1⅛"	2¾"	10"	3"	180	1500 lbs.	$...........

Floor Space 78"x30".



CABINET TURRET LATHE.

CABINET TURRET LATHES.

The Cabinet Turret Lathe, for the use of workers in brass and iron, is excessively compact and firm, and, therefore, is not liable to spring and chatter. It approaches perfection more closely than any yet designed for general use on "chucked" work.

Skillful workmen recognize the difficulty, if not the impossibility, of doing accurate work on the common lathe, it its centers are not in line. This difficulty is much magnified in the turret lathe, where a large portion of the work is done by burs or rose reamers, and in which, owing to the solidity of construction, there is no accommodating "spring" of the machine, which permits the tool to assume and maintain a position nearly in line with the head spindle.

The centers of all lathes do agree when the lathe is new and properly made, but use, especially on brass work, soon wears the grooves of the back-head or tail-stock and the V's of the bed, so that the centers are not in line with each other, and then it becomes impossible to ream or tap a hole with a sharp reamer or tap without making the hole larger than the tool which cuts it. To meet this trouble our head-stock (which swivels) is placed on the column that constitutes the tool-box, and to this column is firmly bolted the short and strong bed on which the turret head rests.

SPECIFICATIONS.

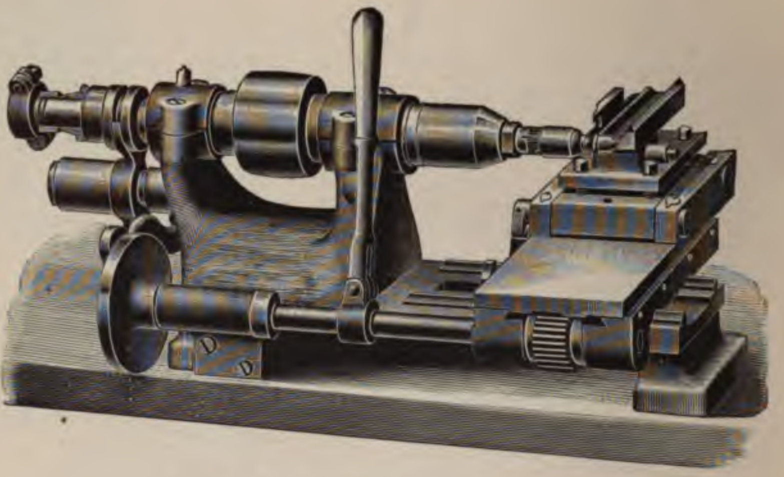
Code Word.	Swings.	Length Bed.	Cone Belt.	Countershaft.			Weight.	Price. with Engine Feed.	Price without Engine Feed.
				Diam. Pulleys.	Face.	Rev.			
Folganca	18"	6'	2¼"	10"	3"	180	2000 lbs	$.	$................
Folgazao	20"	7'	2¾"	12"	3"	160	2950 lbs	$.......	$.... ....

Floor Space 74"x24".

Furnished with Screw Apparatus.

PART III.

FORMING LATHES.



BENCH FORMING LATHE.

SPECIFICATIONS.

Code Word.	Swing.	Length Bed.	Hole in Spindle.	Hole Through Wire Feed.	Countershaft.			Weight Complete.	Price Complete.
					Diam Pulley.	Face.	Rev.		
Folgern...	12″	1′ 8″	⅞″	½″	5″	3¼″	400	290 lbs.	$.. .....

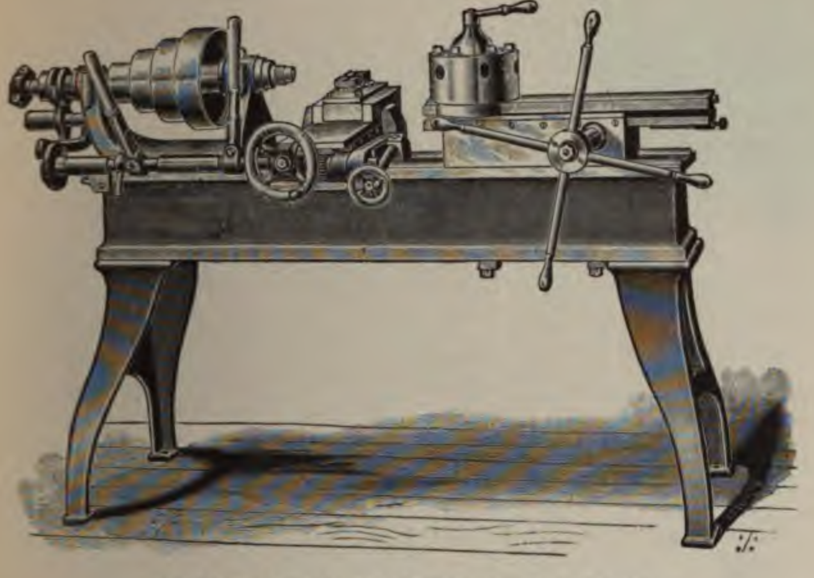
PLAIN FORMING LATHE.

We can also furnish a headstock similar to the above mounted on a plain iron bed with legs. A suitable tailstock with spindle operated by lever is always supplied with this lathe.

SPECIFICATIONS.

Code Word.	Swing.	Length Bed.	Morse Taper Foot Block Spindle.	Hole in Spindle.	Hole Through Wire Feed.	Cone Belt.	Countershaft.			Weight	Pri
							Diam Pulleys.	Face.	Rev.		
Folglich...	12″	4′	No. 2	⅞″	½″	1¾″	5″	3¼″	*400	650	$..
Folgoro...	18″	5′	No. 3	1⅜″	1″	3″	6″	4½″	*475	1050	$...

*These speeds are for brass work. For soft metals, speeds should be 700 and 825 revolutions respectively.



IMPROVED FORMING LATHE.

These machines have been designed to meet the needs of manufacturers of injectors, valves, lubricators, door knobs, plumbers' goods, and all kinds of lighter brass work, and other work to be turned to ornamental or specific shapes.

500 to 700 door knobs, 1000 to 1200 roses, 500 to 2500 valve bonnets, according to size, may be turned perfectly smooth in 10 hours by unskilled labor on this machine, and other work in proportion. A vise may be put in place of the tool holder which converts the lathe into a hand milling machine

We furnish these improved forming lathes either with a turret as shown in the above cut or with foot block, and the foot block is furnished either with or without the automatic lever grip.

Countershafts with tight-and-loose pulleys, and self-aligning and self-oiling boxes, are furnished with the foot block lathes, and Vanderbeek's self-oiling, reversing, friction countershafts are furnished with the turret lathes.

One great advantage of doing work with forming tools is that the forming tool, once right, is always right, and does not call for the delicate adjustment and careful watching that are necessary with complicated turret tools, or other special tools and fixtures.

This machine, with slight changes, may be used for other purposes than for which designed, such as shaving or polishing heads of screws, light hand milling, cutting rods into pins, light grinding, etc., etc.

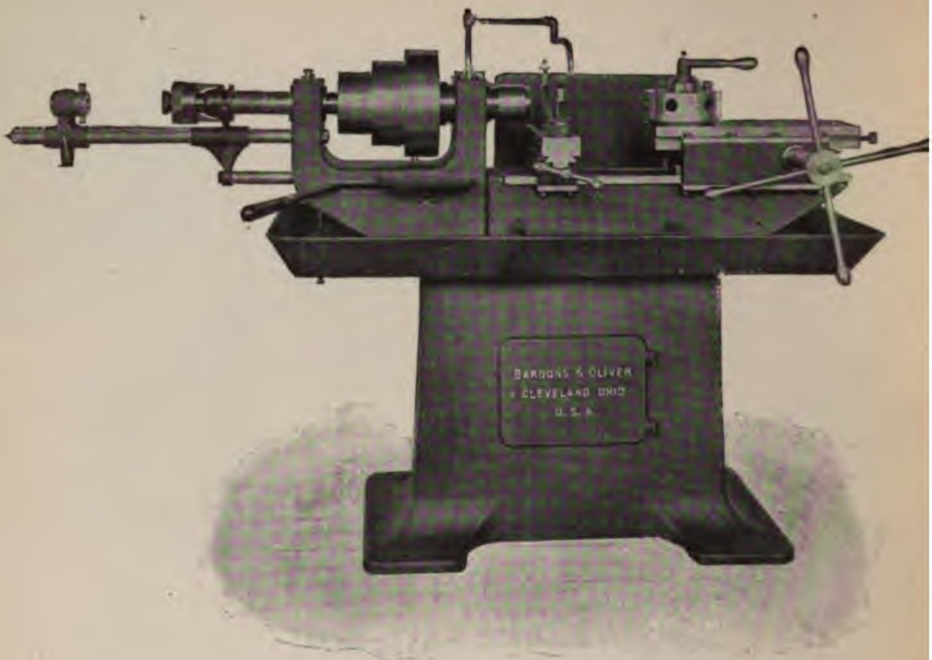
IMPROVED FORMING LATHE SPECIFICATIONS.

Code Word.	Swing.	Length Bed.	Hole in Spindle.	Diam Turret.	Diam of Holes in Turret.	Cone Belt.	Countershaft.			Weight.	Price.
							Diam Pulleys.	Face.	Rev.		
igram...	12″	4′	⅞″	6¾″	1″	2½″	8″	4″	*300	850 lbs.	$....... ......
igruedo..	18″	5′	†1⅜″	8¾″	1½″	4″	12″	5″	*375	1450 lbs.	$....... ....

*These speeds are for brass work, and can be varied for softer or harder metals.
†Holes made special size.

PART IV.

SCREW MACHINES.



SCREW MACHINES, STYLE B.

With plain head, cut-off rest, oil pan and oil pump, with or without automatic chuck and wire feed. Principal dimensions, weights, etc.

Number of Machine. Capacity of Chuck.	0 ⅜"	1 ¾"	2 1"	3 1¼"	4 1½"	4 1
Diam. of Hole in Spindle	9/16"	1 1/16"	1 5/16"	1⅝"	1⅞"	2
Diam. of Hole in Automatic Chuck Plunger	13/32"	13/16"	1 1/32"	1 9/32"	1 9/16"	1
Largest Diameter of Cone	5"	8"	9½"	10½"	11"	11
Width of Belt	1¼"	2¼"	2½"	3"	3½"	4
Diam. of Turret	3⅞"	5¼"	6¼"	7⅜"	8⅝"	8
Diameter of Holes in Turret	⅝"	⅝"	1"	1¼"	1½"	1
Center of Holes to Top of Slide	1⅛"	1⅜"	1⅜"	2"	2⅜"	2
Motion to Turret Slide	2¼"	3"	5"	6¾"	7¼"	7
Friction Pulleys on Countershaft	7x2¼'	9x2¾"	10x2¼"	12x3¾"	14x4⅜"	14x5
*Countershaft Speeds	260	180	150	130	120	10
Net Weight of Machine with Counter	400 lbs.	800 lbs.	950 lbs.	1325 lbs.	1700 lbs.	1800
Weight, Crated	425 lbs.	85 · lbs.	1000 lbs.	1400 lbs.	1875 lbs.	1975
Weight, Boxed for Export	600 lbs.	1070 lbs.	1300 lbs.	1700 lbs.	2175 lbs.	2275
Boxed Dimensions	40x26x51	52x28x52	59x31x52"	73x40x54"	81x42x55"	81x
Code Word for Machine without Automatic Chuck and Wire Feed	Fonsadera	Fonteinbak	Fonteji	Fonticulum	Fontinal	Foodl
Price without Automatic Chuck and Wire Feed	$	$	$	$	$	$
Code Word for Machine with Automatic Chuck and Wire Feed	Fantainha	Fontejam	Fontejus	Fontigena	Fonto	Foolh
Price with Automatic Chuck and Wire Feed	$	$	$	$	$	$
Code Word for Power Feed to Turret	Fontalibus	Fontejarum	Fonticule	Fontigenis.	Fonvielle	Foolh
Extra for Power Feed to Turret	$	$	$	$	$	$

*Countershaft speeds given above are for soft steel or iron

Machines No. 0, No. 1 and No. 2 are furnished with lever feed to turret slide and to cut off and with wire feed lever at end of head

Machines No. 3 and No. 4 are made as shown in cut (lever feed to cut-off furnished if desired.)

Machine No. 4¼ is furnished with turnstile to operate the wire feed, and has a two-grade cone.

Weights given above include automatic chuck and wire feed.

SCREW MACHINES, STYLE B.

These machines are designed for the manufacture of screws and studs and all duplicate parts which can be made from bar stock. They are provided with oil pan, automatic chuck, wire feed and spindles of extra-large capacity.

An oil pump driven from an independent countershaft is provided.

The heads are made in three styles: plain, plain back geared and friction geared. In most cases the latter is preferred, as with it a quick change in the spindle speed can be made without stopping the machine. This change is about right for the difference between boring and tapping, etc., etc.

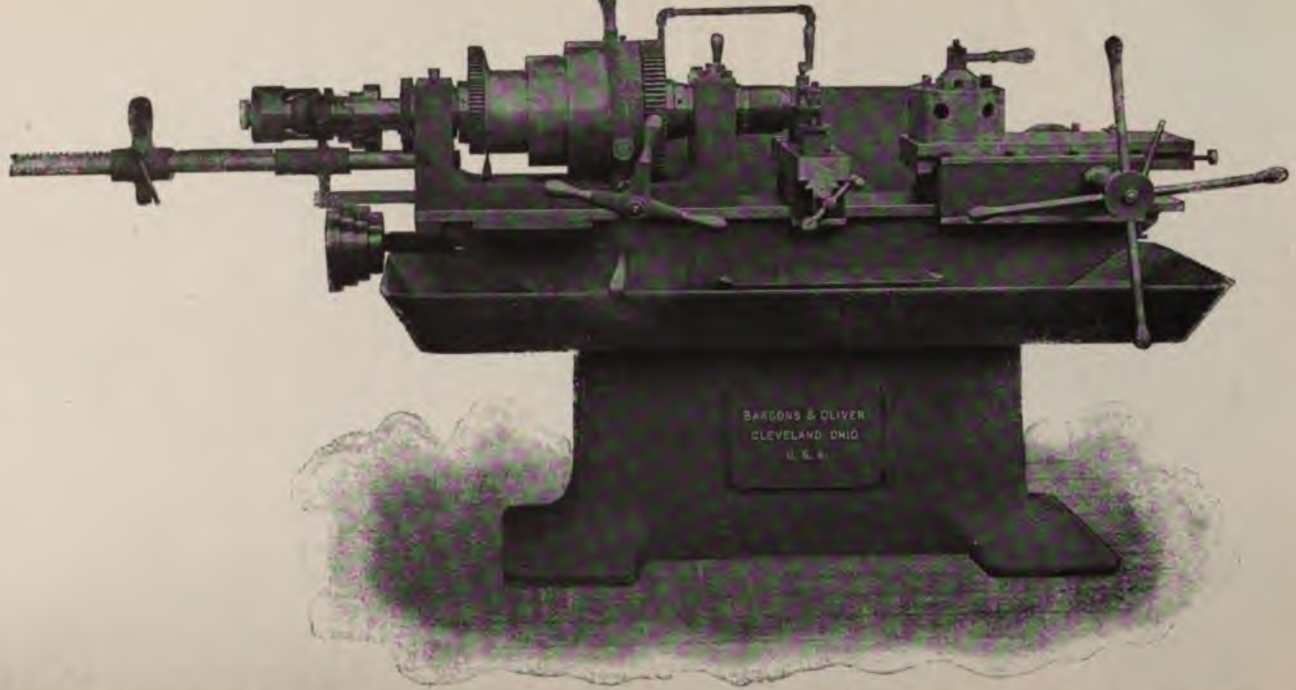
The wire feed mechanism is operated by a lever on the smaller sized machines, and rack and pinion with turn-stile on the large ones.

The automatic chuck for the wire feed is of a new design which greatly reduces the overhang of the chucks. It permits unusually heavy cuts to be taken without chattering, and produces much better work. The turrets revolve automatically around a hardened and ground stud. Special provision is made for oiling, taking up wear and adjusting. The turret is of large diameter, and can easily be kept in alignment, both horizontally and vertically.

The cut-off rests are made with either lever or screw feed to the slide. The latter is particularly desirable when forming tools are to be used, or other heavy work done. A new style of gib forms one side of the saddle. It is held in place by large screws and makes a much more solid and satisfactory construction than the old style flat steel gib backed up by gib screws. Two short stop screws at front and rear ends of the slide enable the transverse motion of the slide to be easily regulated. A vertical adjustment of the tool posts is also provided.

The automatic feed to the turret slide has an adjustable automatic throw-out.

A turret oiling device, power cross feed to cut-off rest and centering attachment can be supplied when desired.



SCREW MACHINE, WITH FRICTION-GEARED HEAD, POWER FEED TO TURRET, OIL PAN AND OIL PUMP
STYLE B.

SCREW MACHINES, STYLE, B.

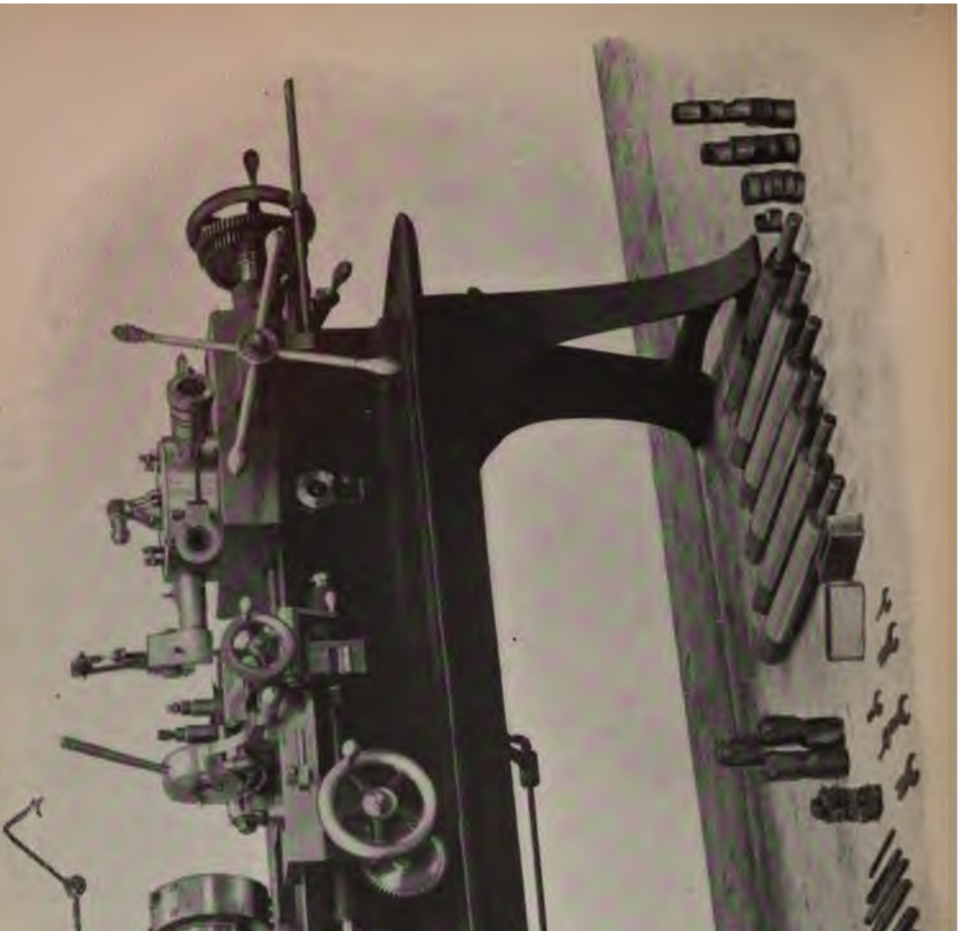
With friction geared head or plain back geared head, cut-off rest, oil pan and oil pump with or without automatic chuck and wire feed.

Number of Machine. Capacity of Chuck.	3 1¼"	4 1½"	4½ 1¾"	5 2"	5½ 2¼"	6 3"
m. of Hole in Spindle	1⅜"	1⅞"	2 3/16"	2 7/16"	2¾"	3⅜"
m. of H. in W. F. Plunger	1 9/32"	1 9/16"	1 15/16"	2 3/16"	2 5/16"	3⅛"
gest Diam. of Cone	10½"	11"	11"	13"	13"	15"
lth of Belt	2½"	3"	3"	3½"	3½"	5"
meter of Turret	7⅜"	8⅝"	8⅝"	9⅜"	10⅛"	13"
meter of Holes in Turret	1⅜"	1½"	1⅝"	1½"	1¾"	2"
ter of Holes to Top of Slide	2"	2⅛"	2½"	2¾"	3"	3⅛"
tion of Turret Slide	6¾"	7¾"	7¾"	8¾"	10¾"	14"
ction Pulleys on Countershaft	10x3¼"	12x3¾"	12x4¼"	14x4⅜"	14x4⅞"	16x5⅞"
Friction-Geared Head Machines						
ntershaft Speeds	240	220	220	200	180	140
t W. of Machine with Counter	1500 lbs.	1950 lbs.	2150 lbs.	2700 lbs.	3200 lbs.	5600 lbs.
ight, Crated	1575 lbs.	2100 lbs.	2300 lbs.	2875 lbs.	3400 lbs.	5900 lbs.
ight Boxed for Export	1875 lbs.	2500 lbs.	2700 lbs.	3300 lbs.	4100 lbs.	7100 lbs.
xed Dimensions	73x38x54"	84x39x55"	86x39x55"	96x42x55"	102x46x56"	136x53x58"
le Word for Machine without Automatic Chuck and Wire Feed	Foolified	Football	Footfalls	Footpost	Footstool	Forabosco
ice, without Automatic Chuck and Wire Feed	$	$	$	$	$	$
de Word for Machine with Automatic Chuck and Wire Feed	Foolify	Footband	Footlight	Footprint	Footvalve	Foragginoa
ice, with Automatic Chuck and Wire Feed	$	$	$	$	$	$
lain Back-Geared Head Machines.						
ntershaft Speeds	300	275	275	250	225	200
t W. of Machine with Counter	1325 lbs.	1800 lbs.	2000 lbs.	2500 lbs.	3000 lbs.	5300 lbs.
Crated for Domestic Shipment	1475 lbs.	1950 lbs.	2150 lbs.	2675 lbs.	3200 lbs.	5600 lbs.
eight, Boxed for Export	1875 lbs.	2350 lbs.	2500 lbs.	3100 lbs.	3900 lbs.	6800 lbs.
xed Dimensions	73x38x54"	84x39x55"	86x39x55"	96x42x55"	102x46x56"	136x53x58"
de Word for Machine without Automatic Chuck & Wire Feed	Foolfying	Footboy	Foothalt	Footrope	Footwaling	Foraggiare
ice, without Automatic Chuck and Wire Feed	$	$	$	$	$	$
deWord for Machine with Automatic Chuck and Wire Feed	Foolishly	Footbridge	Foothold	Footstall	Footway	Foraggiave
ice, with Automatic Chuck and Wire Feed	$	$	$	$	$	$
deWord for Power Feed to Turret	Foolscap	Foodcloth	Footlicker	Footstep	Foppbecher	Foramente
duct for Power Feed to Turret	$	$	$	$	$	$
de Word for Power Cross Feed to Cut-off Rest	Foolstones	Footed	Footplough	Footstick	Forabilium	Foramello
xtra for P. C. F. to Cut-off Rest	$	$	$	$	$	$

*Countershaft speeds given are for soft steel or iron.
Weights given above include automatic chuck and wire feed.

No. 3 machine has lever to operate wire feed, the lever being brought within easy reach of operator. Larger size machines are furnished with turnstile to operate wire feed as per cut on page 70.

Power cross feed to cut-off rest can be furnished when desired. For some work this is almost indispensable. The power feed is obtained by means of worm gear and worm; the worm gear being on screw. The worm is contained in a worm box, which is pivoted so that worm may be dropped out of mesh with gear. Power is taken from rear end of spindle through train of gears, a swinging arm allowing one of the gears to be changed; a set of change gears being furnished with machine. A universal joint with telescoping sleeve transmits motion to worm, this construction allowing cut-off rest to be moved along to any position on bed. Automatic throw-out to feed is provided which can be set at any position.


PATENTED
NILES
TOOL WORKS
HAMILTON OHIO

No. 2 SCREW MACHINE.

This machine is made from our improved and latest patterns.

The cone has four steps for belt 2½ inches wide. Is powerfully back-geared. The spindle is of steel, having hole through center 2 1-16 inches diameter, to finish bolts from ⅜ inches to 1 inch diameter.

Both the cone and face gear are loose on the spindle, and are driven the one by a friction, the other by a tooth clutch, connected to a sliding hub splined to the spindle. The friction obviates the shock incident to starting the spindle at a high velocity, as the motion is gradual, while the tooth clutch on the face gear insures steadiness of motion under heavy strain.

The turret is made to revolve and lock automatically. The point at which the revolution of turret takes place is adjustable, and is indicated by a gauge at the front of the turret slide.

The carriage has a power feed operated from the back-feed shaft, independent of the motion obtained by the leaders.

A pump is supplied with each machine which pumps the oil or water from a tank in the bed of the machine, and is provided with a safety valve whereby all excess of oil is returned to the tank, and allows the pump to continue working when the drip cocks at the tools are closed.

We furnish the machine with or without a complete equipment of tools and carriage, as may be desired.

We generally furnish with the machine the following articles:

- The Countershaft.
- All Necessary Wrenches.
- Two Oil Pots.
- Center for Turret.
- End Gauge.
- Turner, with 6 Bushes.
- Sizer, with 6 Bushes.
- Die-Holder, with 6 Dies.
- Open Dies, 6 sizes.
- 6 Open-Die Hobs.
- 6 Hobs for Lead-Screw Nuts.
- 6 Nut Taps.
- 6 Lead Screws, with Nuts.
- 6 Solid In-and-Out Calipers.

The 6 sizes referred to are ⅜, ½, ⅝, ¾, ⅞, 1; all standard size and thread. We can furnish tools for any peculiar sizes, shapes, or threads, samples of work being furnished us. For thread work we require tapped holes to work from as well as threaded screws.

The countershaft has three pulleys 12 inches diameter, 5½ inches face. Speed, forward 140 revolutions, backward 210 revolutions per minute.

Code Word, for Complete Machine, Malignant. Weight .... Price, complete, $ ....

Price, without tools, $ ....

No. 3 SCREW MACHINE.

This is a very heavy and powerful machine, made from new patterns and embracing the latest patented improvements.

Capacity, ⅝-inch to 1½-inch screws.

Dies will work up to 2 inches. With the leaders, threads can be cut up to the full size of stock the machine will take.

The spindle has hole 2 15-16 inches diameter through it.

The cone has four steps for a 3½-inch belt. and strongly back geared.

Both the cone and face gear are loose on the spindle, and are driven, the one by a friction and the other by a tooth clutch, connected to a sliding hub splined to the spindle. The friction obviates the shock incident to starting the spindle at a high velocity, as the motion is gradual, while the tooth clutch on the face gear insures steadiness of motion under heavy strain.

The turret revolves and locks automatically. The point at which the revolution of turret takes place is adjustable and is indicated by a gauge at the front of turret slide.

The carriage has a power feed operated from the back feed-shaft, independent of the motion obtained by the leaders.

A pump is supplied with each machine which pumps the oil or water from a tank in the bed of the machine, and is provided with a safety valve whereby all excess of oil is returned to the tank, and allows the pump to continue working when the drip cocks at the tools are closed.

The outfit usually furnished with the machine consists of taps, dies, etc., for cutting from ⅝ inch to 1½ inch inclusive, as follows:

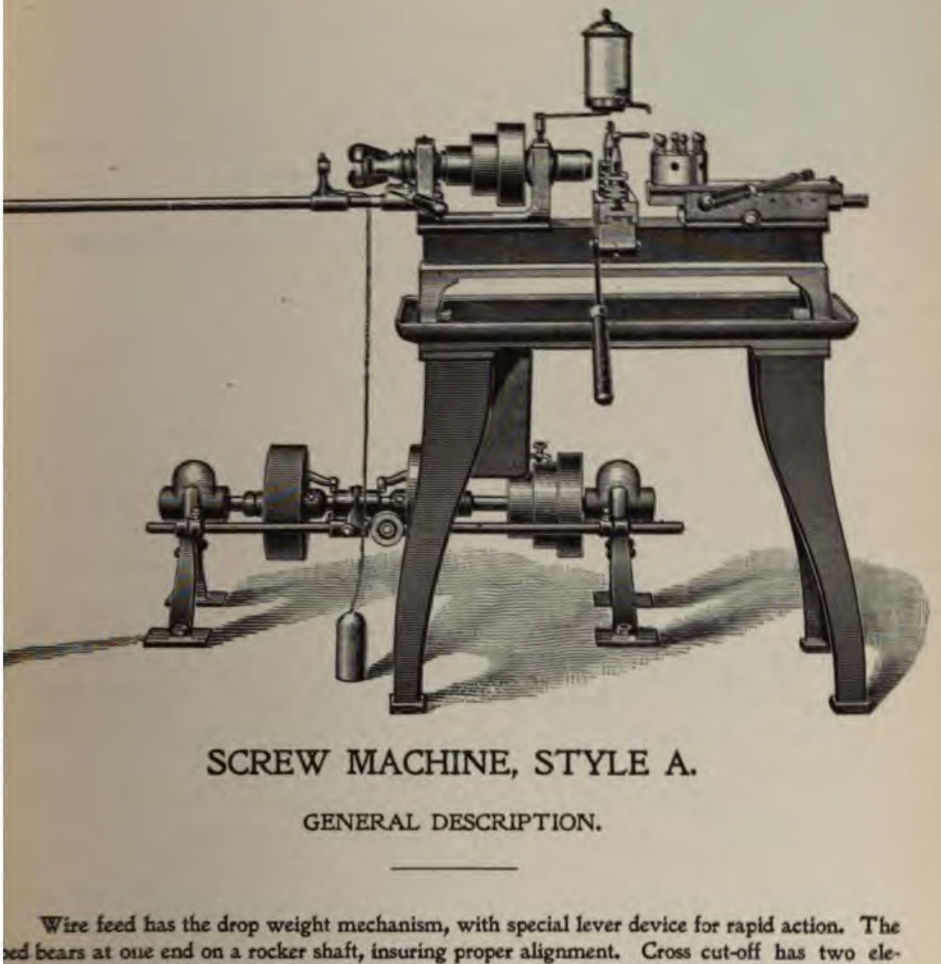
8 Machine Taps.
8 Standard Solid Dies.
8 Hobs for Dies.
8 Standard Caliper Gauges
8 Steel Leading Screws.
4 Brass Nuts for leading screws, two threads on each.
8 Hobs for leading-screw nuts.
1 Opening Die-Plate, with 8 sets of dies.
2 Cutting Tool-Holders, with 8 sets of Standard Collars each.
1 Center.
1 Stop.
1 Die Holder for solid dies.
2 Oil Pots.
The Countershaft.
All Necessary Wrenches.

The countershaft has three pulleys 15 inches diameter, 8 inches face.

Speed, forward, 200 revolutions; backward, 300 revolutions per minute.

Code Word, for complete Machine, Mallard. Weight ....

Price, complete $ .... Price, without tools $ ....



SCREW MACHINE, STYLE A.

GENERAL DESCRIPTION.

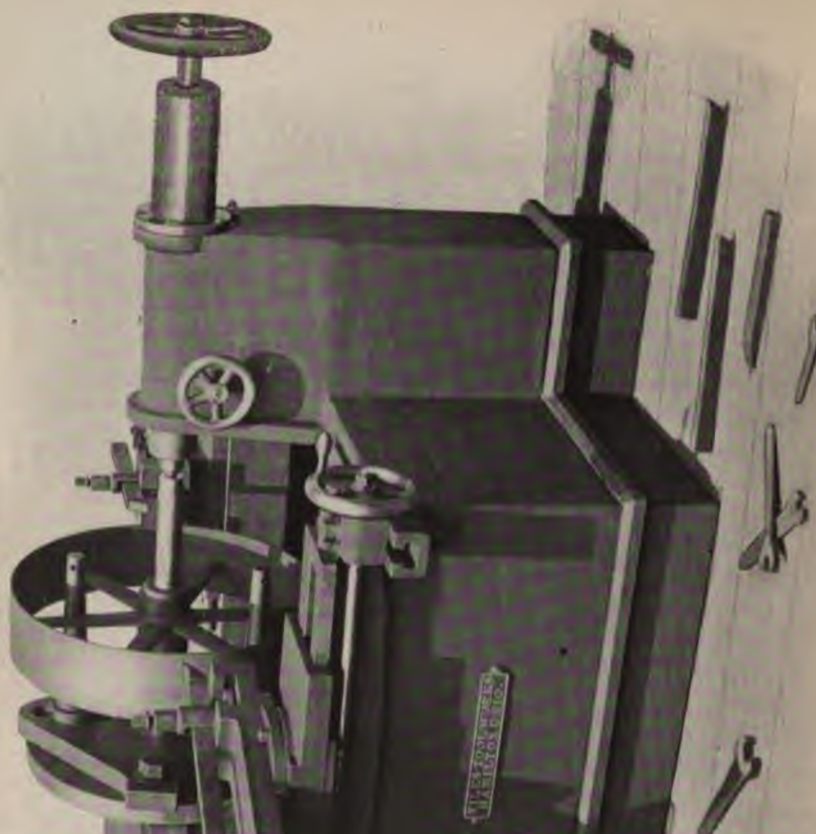
Wire feed has the drop weight mechanism, with special lever device for rapid action. The bed bears at one end on a rocker shaft, insuring proper alignment. Cross cut-off has two elevating tool posts. Machine is furnished with one 11-16 inch collet, oil pot, oil receptacle, self-oiling friction countershaft, wrenches, etc.

No. 2 SCREW MACHINE SPECIFICATIONS.

	Swing Over Bed.	Capacity Through Spindle with Wire Feed.	Capacity without Wire Feed.	Diam. of Turret.	Diam. of Six Holes in Turret.	Length that can be Milled.	Width of Cone Belt.	Countershaft.			Weight
								Diam. Friction Pulleys.	Width of Face.	Revolutions	
la.	9″	11-16″	⅞″	4⅝″	11-16″	3¾″	2″	10″	3″	350	600 lbs

PART V.

PULLEY MACHINERY.



50-INCH SPECIAL PULLEY LATHE.

SPECIAL PULLEY MACHINES.

As to the capacity of these machines we desire to call attention to the following data:

From eighteen to twenty pulleys, 30 inches diameter, 8 inches face, can be bored and turned in ten hours, one man running both machines.

An amount of work equal to the above is the regular every day performance of these machines in our own works, and we have equally satisfactory reports from others using them.

At this rate the cost of this work is reduced to a minimum; for a 30-inch pulley from ten to fourteen cents for boring and turning.

An ordinary merchantable pulley 30 inches diameter, 8 inches face, weighs about 120 pounds. At 2½ cents per pound the pulley casting costs $3.00. Taking cost of labor for boring and turning at fourteen cents, as above, makes the cost of this finished pulley $3.14. The list price is $18.00; at 60 per cent. discount the net price is $7.20.

The profit to be made by the use of these machines is very evident, and certainly warrants a considerable investment in such machines.

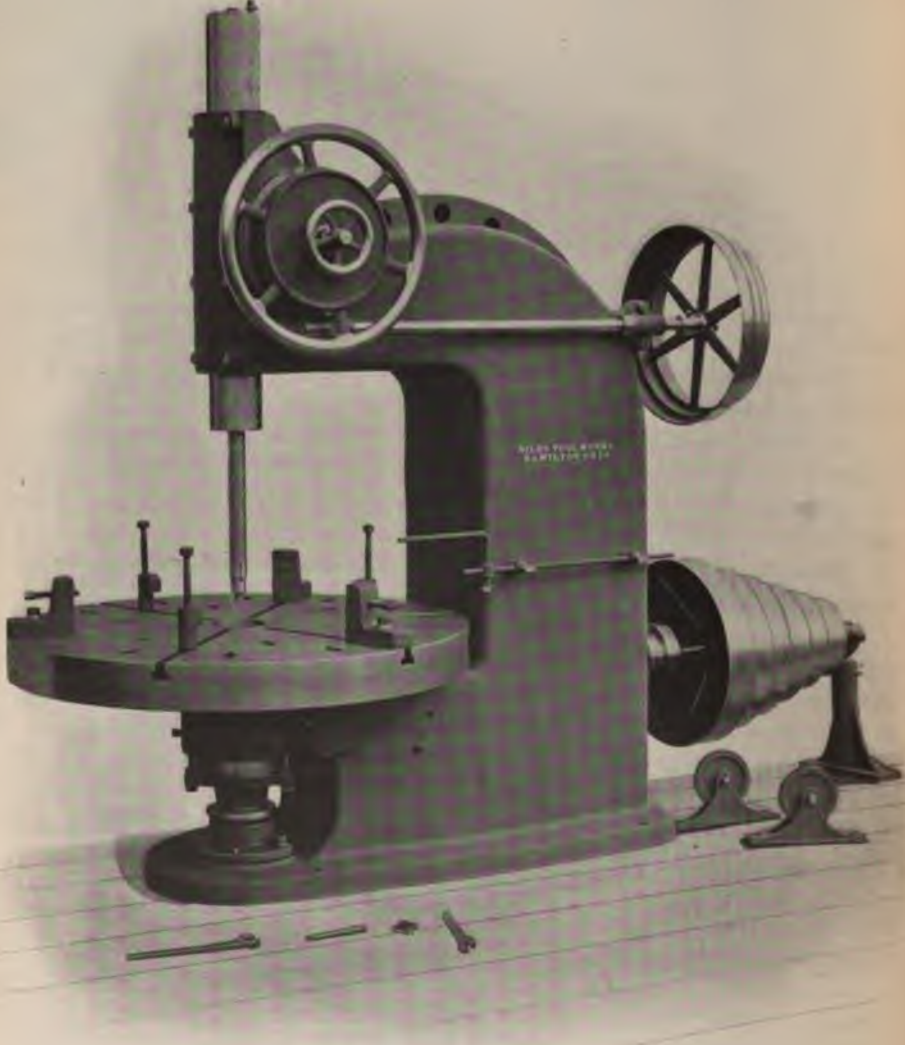
The time named above is not exceptional, or made on a trial test, but can be duplicated every day. Quite recently twelve pulleys, 24 inches diameter, 5½ inches face, and six pulleys 30 inches diameter, 6 inches face, were bored and turned in six and one-half hours.

The superintendent of a large concern in the East saw two cuts run over a 30-inch pulley in fifteen minutes. We have since received their order for a set of 60-inch machines.

We solicit a close investigation of these figures, and a careful inspection of the machines.

DIMENSIONS.

Code Word.	Swing.	Width will Turn.	Countershaft.			Weight.	Price.
			Diam.	Face.	Rev.		
Naughtiness	40″	16″	18″	5″	210		$
Naughty	50″	24″	20″	5¼″	175		$
Nauseate	60″	24″	20″	5¼″	175		$



SPECIAL PULLEY BORING MACHINE.

SPECIAL PULLEY BORING MACHINES.

50 AND 60-INCH SWING.

Designed especially for boring pulleys, gears or other objects, as a companion machine to our Special Pulley Lathe.

The two machines form a set for boring, turning and polishing pulleys that cannot be equalled for rapidity and excellence in executing this work.

The face-plate is revolved by powerful gearing, driven by a cone with six steps for a belt 4 inches wide.

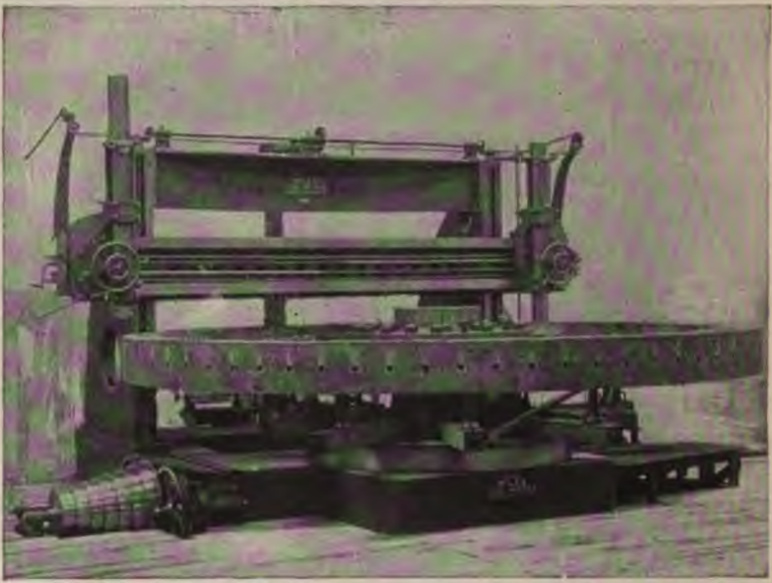
The Boring-Bar is fed automatically, with three changes of speed. It is counterweighted and has quick return. The feeds are thrown in instantly by friction.

One tool-holder, a set of chuck-jaws and a set of special clamps for holding pulleys, are furnished with each machine.

These machines are adapted to a wide range of work and can be advantageously used on a great variety of general machine-shop boring. They will accomplish such work vastly cheaper than a "Chucking Lathe."

SPECIFICATIONS.

Code Word.	Swing.	Countershaft Pulleys.			Weight.	Price.
		Diam.	Face.	Rev.		
Nautical..	50"	24"	4½"	70	....	$..................
Naval.....	60"	24"	4½"	70	....	$..................



For large pulley and fly-wheel work our Boring and Turning Mills cannot be excelled. The above cut shows 16x24-foot Boring and Turning Mill at work on fly-wheel.

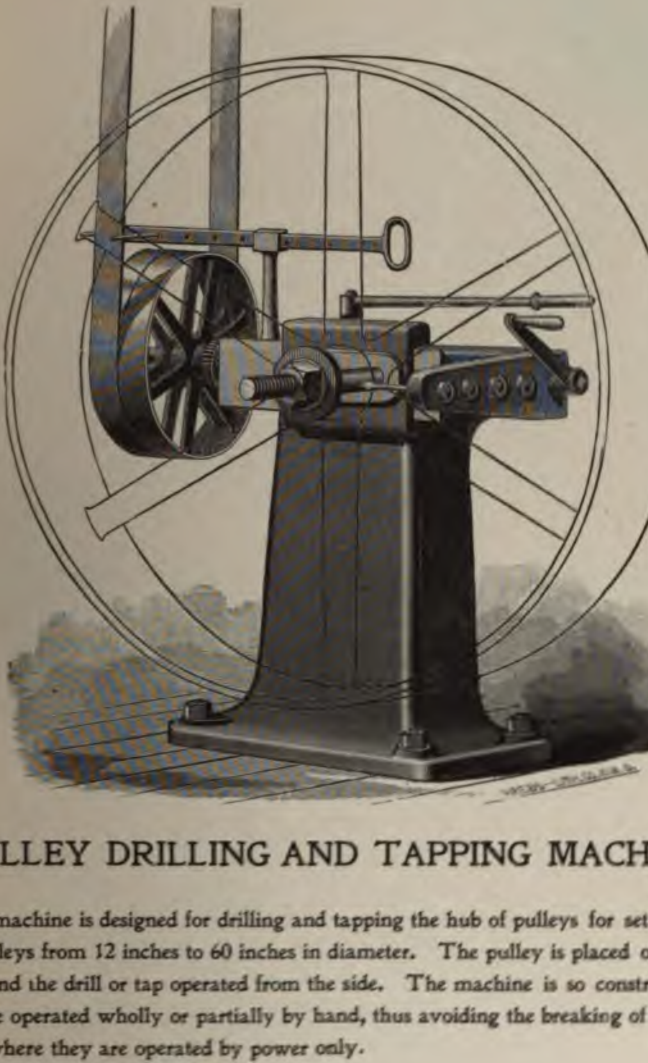
Diameter of fly-wheel, 23 feet, 6 inches.

Weight of fly-wheel, 130,000 lbs.

Rim of fly-wheel, 18 inches by 18 inches.

Rim turned on face and two sides in 48 hours.

See Boring Mills for further data



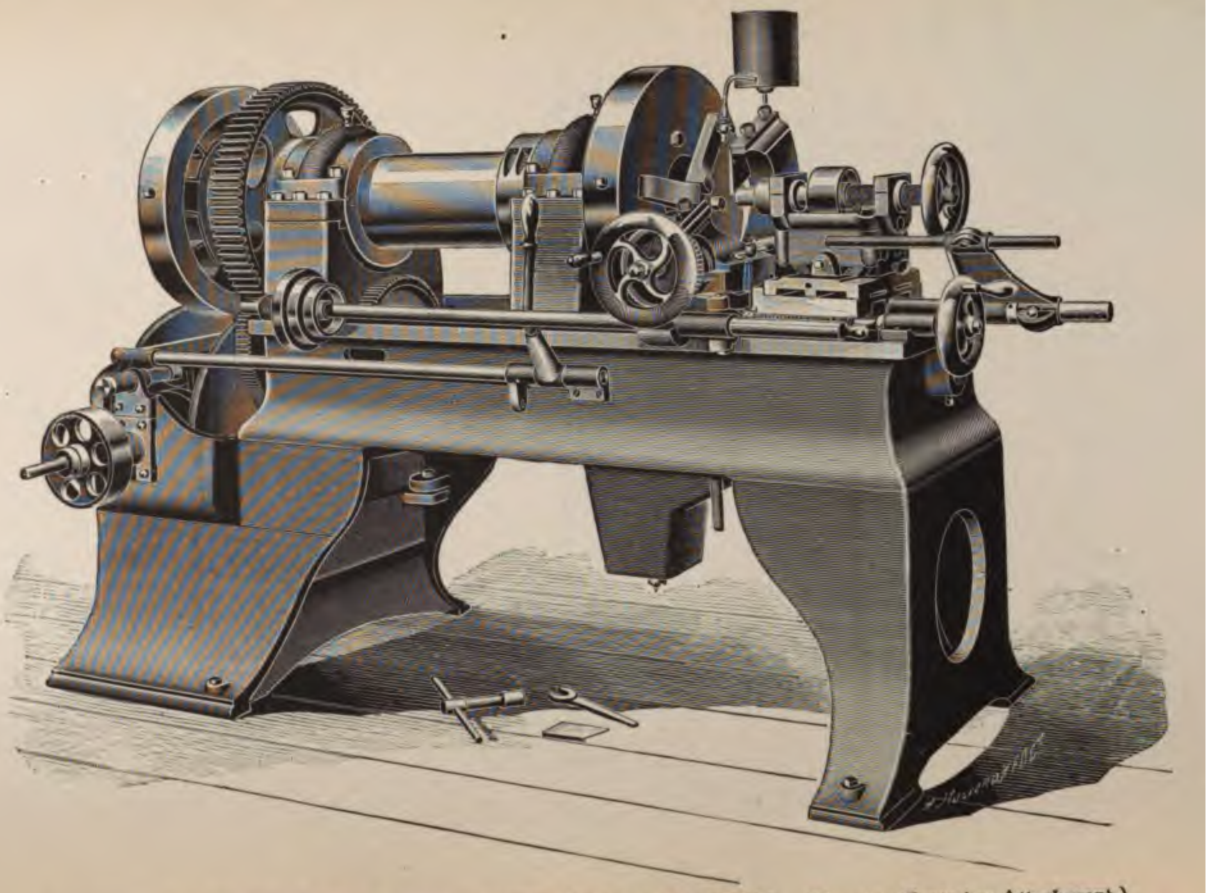
PULLEY DRILLING AND TAPPING MACHINES.

This machine is designed for drilling and tapping the hub of pulleys for set screws. Will take in pulleys from 12 inches to 60 inches in diameter. The pulley is placed on a horizontal mandrel, and the drill or tap operated from the side. The machine is so constructed that the tap may be operated wholly or partially by hand, thus avoiding the breaking of taps, which is common where they are operated by power only.

All gearing accurately cut.
No countershaft is required.
Code Word, Foredoomed.
Price, $ ______

PART VI.

CUTTING-OFF MACHINES.



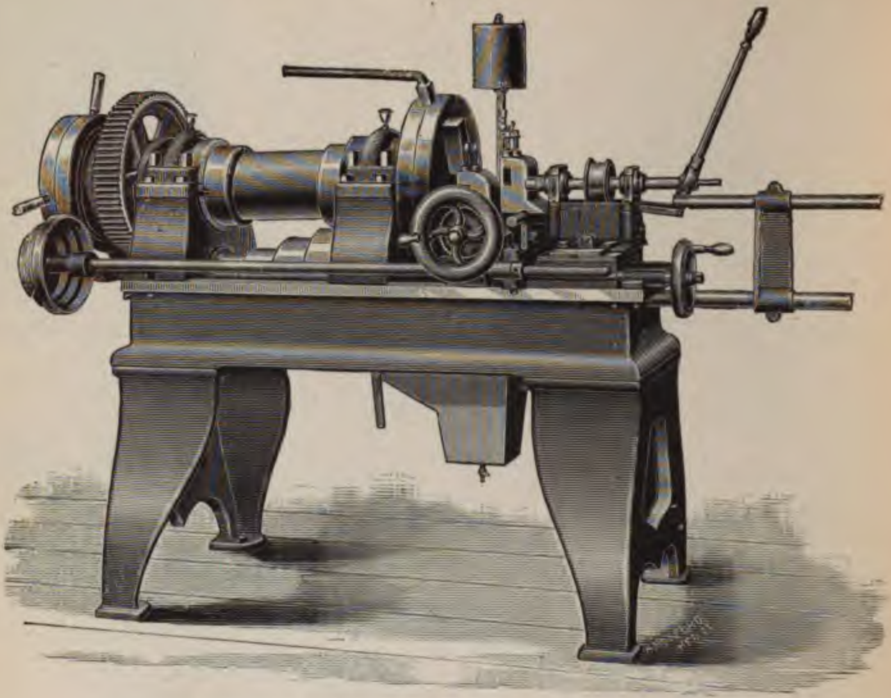
SIX INCH "ACCELERATED SPEED" CUTTING-OFF MACHINE. (Showing Centering Attachment.)

"ACCELERATED SPEED" CUTTING-OFF MACHINES.

For constant use, ten hours per day, where the greatest product at the least expense of time and wages is required, we advise the use of this machine. It requires better care and a better grade of help, but, having these, it will turn out double the amount of work per day than the one described on page 88 and for continuous use is undoubtedly the most economical machine in the market.

SPECIFICATIONS.

Code Word.	Capacity.		Countershaft.			Weight.	Price.
	Largest.	Smallest.	Diam. Pulley.	Face.	Rev.		
Folioband..........	2"	¼"	10"	3"	220—310	1000 lbs.	$... ....
Foliolado	3"	¼"	10"	3"	220—310	1550 lbs.	$............
Foliolate...	4"	½"	12"	3½"	220—325	1900 lbs.	$............
Foliolis...............	5"	¾"	14"	3½"	230—335	2800 lbs.	$...........
Foliosam...	6"	1"	14"	3½"	230—335	3200 lbs.	$... ....



FIVE-INCH CONE CUTTING-OFF MACHINE.

CONE CUTTING-OFF MACHINE.

For occasional, ordinary shop use we recommend the Cone Machine, which can be run by even inexperienced help, and which has excellent capacity, having two speeds on the countershaft, so that when the tools are half-way through, the shipper can be thrown over and the faster speed used for the remainder of the cut. This style of machine is simple and durable and requires the minimum amount of attention and its capacity exceeds that of any other machine.

CENTERING ATTACHMENT.

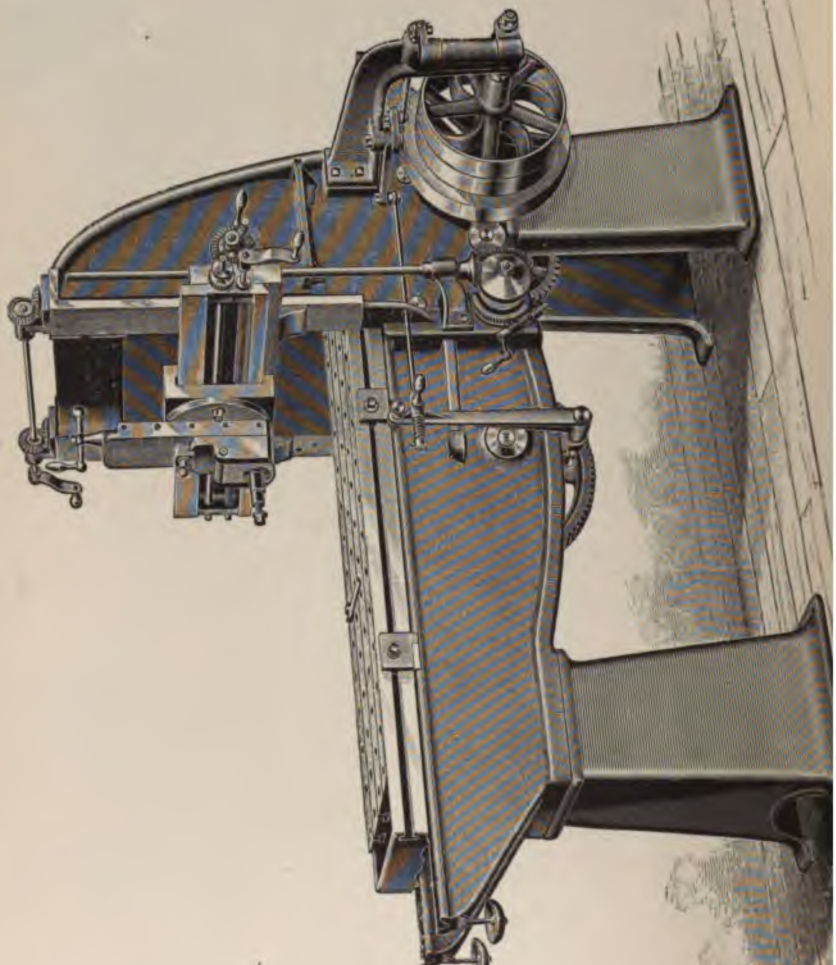
Any of these machines can be supplied with an attachment for drilling and centering the ends of stock. This is a convenient and accurate machine for this purpose, and will be found very useful when this work is required.

SPECIFICATIONS.

Code Word	Capacity.		Countershaft.			Weight.	Price.
	Largest.	Smallest.	Diam. Pulleys.	Face.	Rev.		
Folhoso ...	2″	¼″	10″	3″	100	800 lbs.	$ ....
Foliaba ...	3″	⅜″	14″	3½″	60 - 100	1400 lbs.	$ ....
Foliaire ...	4″	½″	12″	3″	100—160	1750 lbs.	$ ....
Foliated...	5″	¾″	14″	3½″	100—180	2200 lbs.	$ ....
Foliculo ..	6″	1 ″	14″	3½″	80—140	2900 lbs.	$ ....

PART VII.

PLANING MACHINES.



16 x 16 INCH x 4 FEET PLANING MACHINE.

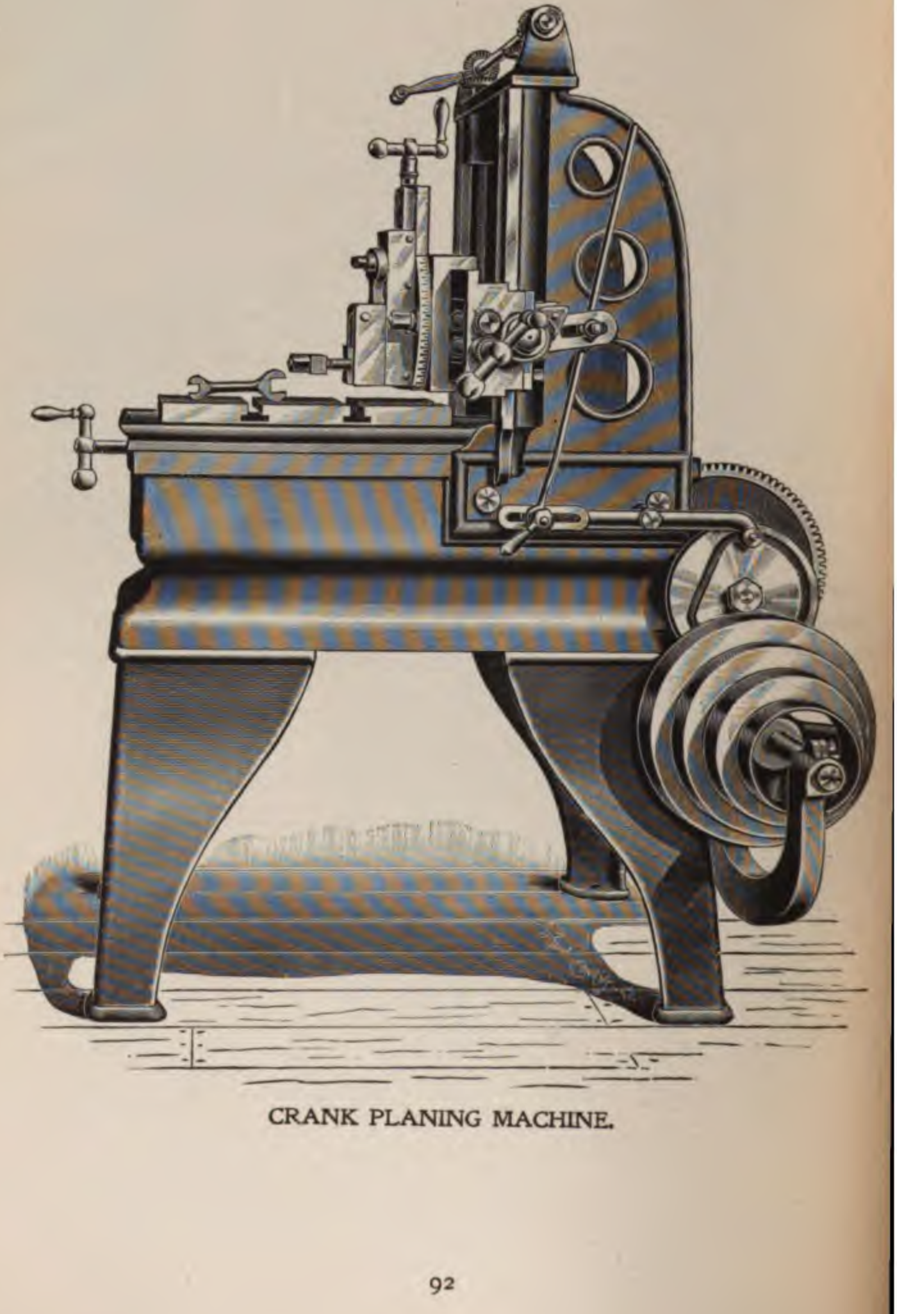
The cut opposite represents a geared friction planer, which planes 16 inches wide, 16 inches high and four feet in length. It is strong and heavy in all its parts, and has automatic, horizontal, vertical, and angular feed. It has quick return of table. The belts on this planer never change from their track like a shifting belt planer, whereby is secured more power and saving of belts. For die work and use in tool rooms this Planer is particularly adapted, for it will plane accurately up to a line, and work on a short stroke. It has a cone pulley for change of speed for hard or soft metal.

The advantages claimed for this planer are :— Perfect accuracy of stroke, tool always planing up to a line; short stroke; the planer will reverse in one inch; having a cone, by which two speeds are obtained for iron and steel; has more power than a planer with shifting belts and makes less noise. For first-class work this planer has proved itself a superior tool.

We can also furnish this planer with belt-shifting device. In ordering please specify which kind of planer is wanted.

SPECIFICATIONS.

Code Word.	Planes.			Countershaft.			Weight.	Price.
	Wide.	High.	Long.	Diam. Pulleys.	Face.	Rev.		
Foliosos	16″	16″	48″	10″	3	250	2200 lbs	$...... .....



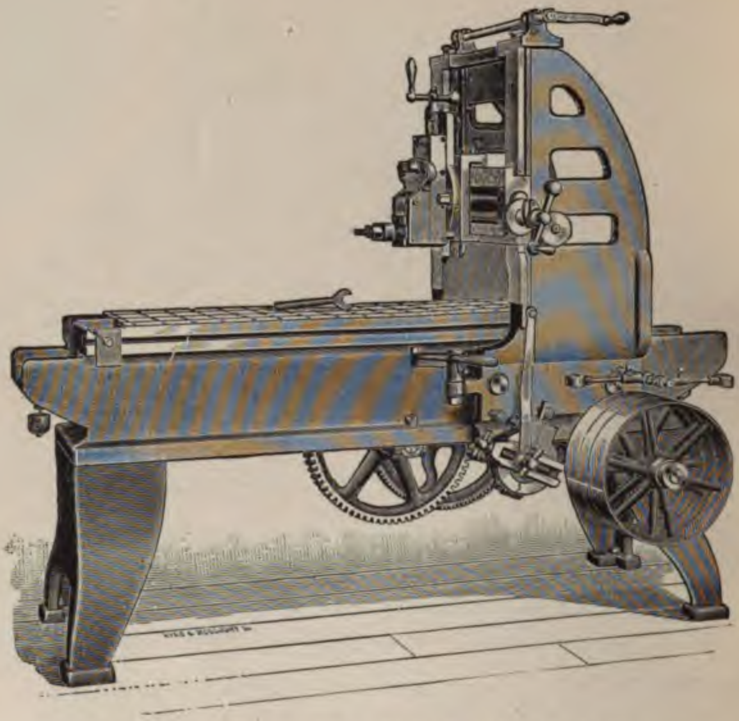
CRANK PLANING MACHINE.

CRANK PLANING MACHINE.

This planer has positive, automatic, cross, down, and angular feeds. Table has Whitworth quick-return motion and is kept in position by gibs. Cone has four changes of speed strongly geared. Running parts made to take up and compensate for wear. The length and speed of stroke are easily adjustable.

SPECIFICATIONS.

Code Word.	Planes.			Cone	Countershaft.			Weight.	Price.
	Wide.	High.	Long.	Belt.	Diam. Pulleys.	Face.	Rev.		
Folioter..	16"	16"	18"	2½"	12"	3½"	120	1750 lbs.	$.. ....



17x17 INCH PLANING MACHINE.

These planers are very heavy and well-proportioned, powerfully geared and capable of doing heavy and light work with great accuracy. They have large steel shafting. Extra long bearings with cap boxes. All gears and racks accurately cut from solid blanks.

Patent track lubricators, a simple and exceedingly valuable device which keeps tracks perfectly oiled.

Slots in table planed from the solid. Holes in table drilled and reamed. Quick return. Patent friction feed, entirely disconnected from shipper.

Patent cross-head fastening, a powerful clamping device operated by one motion of a conveniently situated lever, thoroughly effectual and durable.

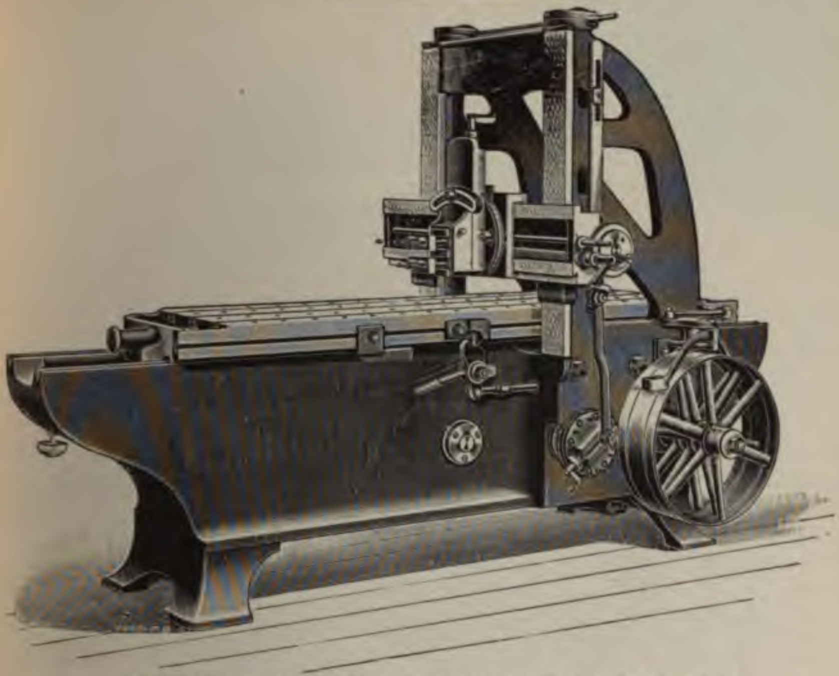
Best self-acting horizontal, vertical and angular feeds. Cross-head fits all carefully scraped.

By means of the offsets in the uprights, shown in cut, the capacity of the planer is increased by about 2 inches in width for about 5 inches above the table.

Countershaft and wrenches with each machine.

SPECIFICATIONS.

Code Word.	Planes.			Countershaft.			Weight.	Price with one head.
	Width.	Height.	Length.	Dia. T. & L. Pulley	Face T. & L. Pulley	Rev. per min.		
Folklore	17″	17″	3′	....	....	....	2500 lbs.	$ ....
Folkmar	17″	17″	4′	....	....	....	2800 lbs.	$ ....



24 INCHES x 24 INCHES x 6 FEET PLANING MACHINE.

GEARING RATIO is calculated for great power; pinion gears are made from hammered steel; all rack and gear teeth are cut from solid stock; driving gears are contained inside the bed, and are mounted on three steel shafts of large diameter and run in very long boxes, which come close to the gears.

DRIVING-SHAFT— There is one tight and one loose pulley on each side of the planer, the loose pulley having a long hub.

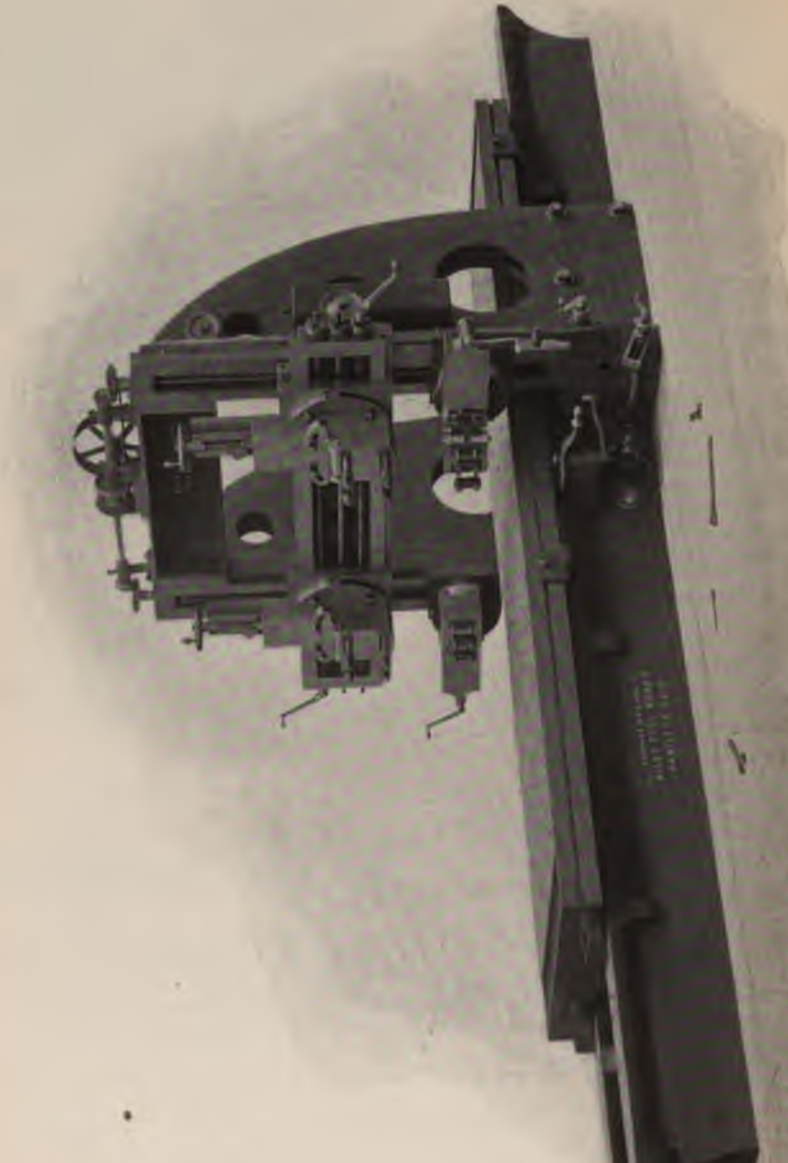
BELT-SHIFTER is a cam device which shifts one belt before the other, and is controlled by hand lever at side of the bed. There is a device on the rocker for locking the shipper when the belts are on the loose pulleys, which prevents belts from working onto tight pulleys and accidentally starting the table.

CROSS-RAIL can be made with one or two heads; when made with two heads the cross-rail is sufficiently long so that the back head can be run out of the way, giving the other head full range of the planer. Screws for raising and lowering cross-rail are accurately cut and nicely adjusted, so that the cross-rail is in alignment with the table, whether rail is at its lowest or highest point.

FEED-WORKS are very simple, and designed to give a fine feed, or one that is very wide for smoothing cuts.

SPECIFICATIONS.

Code Word.	Planes.			Countershaft.			Weight.	Weight per Extra Foot.	Price with One Head.	Price Extra Head on Cross Rail.	Price Extra Side Head.
	Wide.	High.	Long.	Diam. T. & L. Pulleys	Face.	Rev.					
Follebatis	22″	22″	4′	12″	4″	235	3600 lbs	400	$........	$......	$
Follebunt	24″	24″	5′	14″	4″	235	5300 lbs	475	$........	$........	[illegible]



60-INCH PLAINING MACHINE.

GENERAL DESCRIPTION OF NILES PLANING MACHINES.

Our planers are operated by tangent-gear drive, which system gives the fewest gears between the belt and the table, thus reducing the tendency to back-lash and insures smooth running.

All our worms and wheels are cut by special machinery designed by us for this express purpose.

We run our own planers day and night with very heavy cuts and at the highest speed the work and tools will stand. The experience thus gained has been utilized by us in designs which embody massive proportions and careful workmanship. All sliding surfaces are carefully scraped to bearing by hand, all gears are cut from the solid and all shafts and screws are of steel. Shafts run in bronze bearings.

Our patent belt-shifter prevents both belts from running on the driving-pulley at once, and is very easily handled.

Feeds are positive and operate in shortest possible table travel.

Automatic oil-rollers in the ways thoroughly lubricate the table bearings.

All beds are well braced by cross girts and are tied between the cheeks by a broad box reaching the full width of housings, which are also of box form, rest on top and sides of bed and are firmly bolted.

Our usual method is to place the counter parallel with the bed of machine, thus allowing the planer to stand parallel with the line-shaft, but they can be arranged to run at right angles to line shaft, if necessary.

NILES PLANING MACHINES.

LIST OF SIZES.

We have the following sizes in stock or under way at all times, and can make quick deliveries.

Code Word.	Size.	Length of Table.	Diameter Counter Pulleys.	Width of Face.	No. of Revolutions.	Weight.
Middle	26x26"	6'	16"	4"	250	
Midge	26x26"	7'	16"	4"	250	
Midget	26x26"	8'	16"	4"	250	
Midland	26x26"	10'	16"	4"	250	
Midriff	32x32"	6'	20"	5"	200	
Midships	32x32"	8'	20"	5"	200	
Midwinter	32x32"	10'	20"	5"	200	
Mighty	32x32"	12'	20"	5"	200	
Migrate	32x32"	14'	20"	5"	200	
Mild	38x38"	8'	20"	5"	265	
Mildew	38x38"	10'	20"	5"	265	
Milepost	38x38"	12'	20"	5"	265	
Milestone	38x38"	14'	20"	5"	265	
Militant	38x38"	16'	20"	5"	265	
Militaron	42x42"	10'	22"	5"	265	
Militate	42x42"	12'	22"	5"	265	
Militatore	42x42"	14'	22"	5"	265	
Militavono	42x42"	16'	22"	5"	265	
Milite	42x42"	18'	22"	5"	265	
Milk	44x44"	10'	22"	5"	190	
Milkboy	44x44"	12'	22"	5"	190	
Milker	44x44"	14'	22"	5"	190	
Milkmaid	44x44"	16'	22"	5"	190	
Milkman	44x44"	18'	22"	5"	190	
Minaret	48x48"	10'	22"	5"	190	
Mincing	48x48"	12'	22"	5"	190	
Mincingly	48x48"	14'	22"	5"	190	
Mindful	48x48"	16'	22"	5"	190	
Miner	48x48"	18'	22"	5"	190	
Mineral	48x48"	20'	22"	5"	190	

Planers can be furnished with one or two heads on cross rail, side heads on one or both housings. Side heads have power feeds. Cross rail of all sizes raises by power.

LIST OF PLANERS.

LARGE SIZES.

Code Word.	Size.	Length of Table.	Diameter Counter Pulleys.	Width of Face.	No. of Revolutions.	Weight.
Minstrelsy	54x54"	10'	20"	5¾"	235	....
Mintage	54x54"	12'	20"	5¾"	235	....
Miracle	54x54"	14'	20"	5¾"	235	....
Miraculous	54x54"	16'	20"	5¾"	235	....
Mirror	54x54"	18'	20"	5¾"	235	....
Mirth	54x54"	20'	20"	5¾"	235	....
Miserable	60x60"	12'	24"	6"	215	....
Misery	60x60"	14'	24"	6"	215	....
Misfortune	60x60"	16'	24"	6"	215	....
Misgive	60x60"	18'	24"	6"	215	....
Mishap	60x60"	20'	24"	6"	215	....
Mistletoe	72x72"	12'	22"	6"	275	....
Mistress	72x72"	14'	22"	6"	275	....
Mistrust	72x72"	16'	22"	6"	275	....
Mistrustful	72x72"	18'	22"	6"	275	....
Mistune	72x72"	20'	22"	6"	275	....
Mode	84x84"	16'	22"	6"	275	....
Modeling	84x84"	18'	22"	6"	275	....
Moderate	84x84"	20'	22"	6"	275	....
Modesty	84x84"	24'	22"	6"	275	....
Moistness	96x96"	16'	22"	6"	260	....
Molar	96x96"	18'	22"	6"	260	....
Mole	96x96"	20'	22"	6"	260	....
Molecular	96x96"	24'	22"	6"	260	....
Mongrel	120x120"	16'	32"	7"	185	....
Monitor	120x120"	18'	32"	7"	185	....
Monitory	120x120"	20'	32"	7"	185	....
Monkey	120x120"	24'	32"	7"	185	....
Monsoon	144x144"	16'	32"	7"	220	....
Monstrous	144x144"	18'	32"	7"	220	....
Monument	144x144"	20'	32"	7"	220	....
Moonlight	144x144"	24'	32"	7"	220	....

These planers are of immense weight and power, designed for the heaviest duty. Photographs, full description and prices will be furnished upon application.

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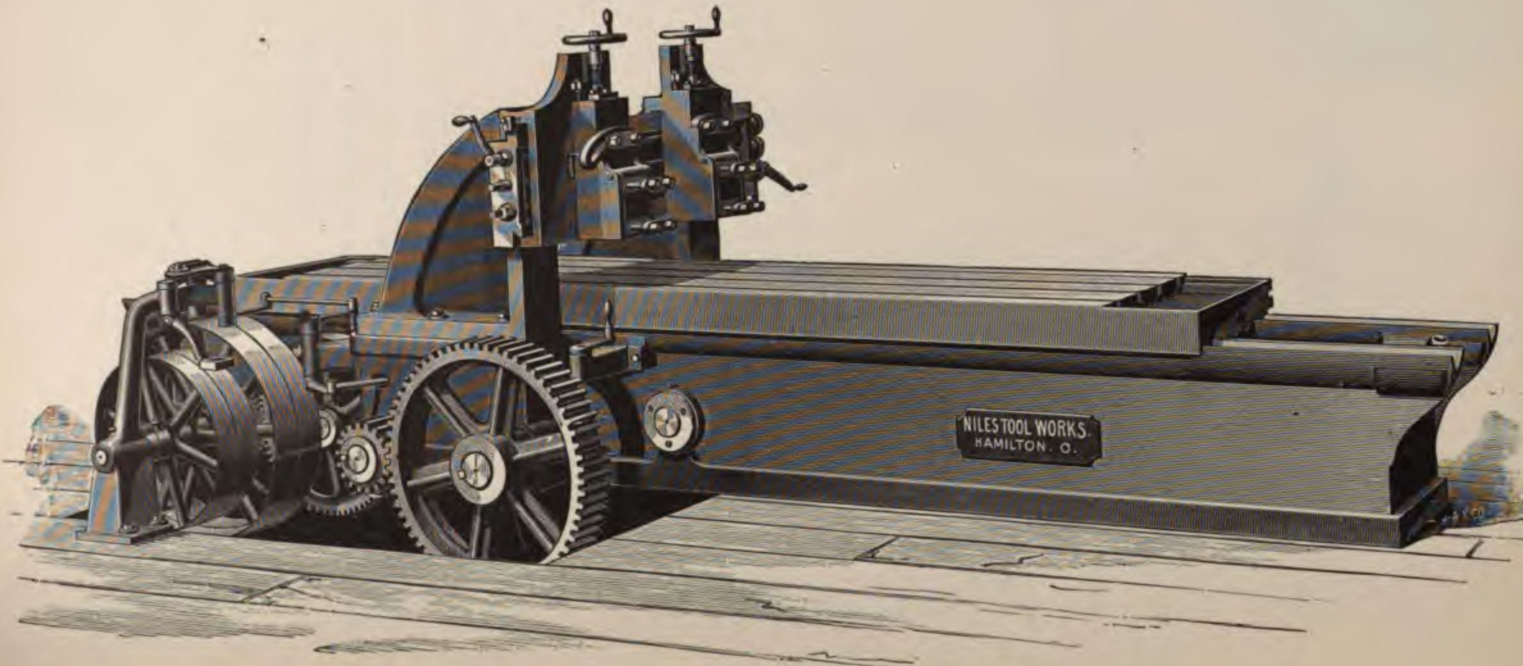

NILES TOOL WORKS.
HAMILTON, O.

36-INCH x 12-INCH FROG AND SWITCH PLANING MACHINE.

36-INCH FROG AND SWITCH PLANING MACHINES.

The rapid planing of railroad frogs and switches is entirely beyond the capacity of the best standard planers.

It is, therefore, necessary to have a machine designed especially for this purpose.

Our planer is built to take 36 inches wide by 12 inches high with fixed cross-rail; or 36 inches by 36 inches with movable rail and hand elevating gear.

The driving train has large pulleys, wide belts, gearing cut from the solid, large hammered steel shafts running in bronze bearings and the main pinion and rack-wheel are steel. This gearing will carry two cuts 1½ inches wide by ⅛-inch deep on the side of a steel rail.

The table is very heavy, is fitted to inner edges of ways and gibbed down so that side displacement is impossible.

The tool slides are placed directly on the inner edges of the saddles without the intervention of swings.

The power cross and down feeds are positive and reversible.

The belts are controlled by our patent shifter which prevents both belts from running on the tight pulley at the same time. Belts are shifted from either side by hand

Machines stand at right angles to line-shaft.

Counter pulleys, 20-inch diameter, 6-inch face, run 280 revolutions for 12-foot cutting and 48-foot return speeds.

SPECIFICATIONS.

Code Word.	Size.	Length of Table.	Weight.	Price.
Morbid..........................	36"x12"	12'	....	$..................
Morbidly..................	36"x12"	15'	....	$..................
Morphine.................	36"x36"	12'	....	$..................
Morsel........	36"x36"	15'	....	$..................

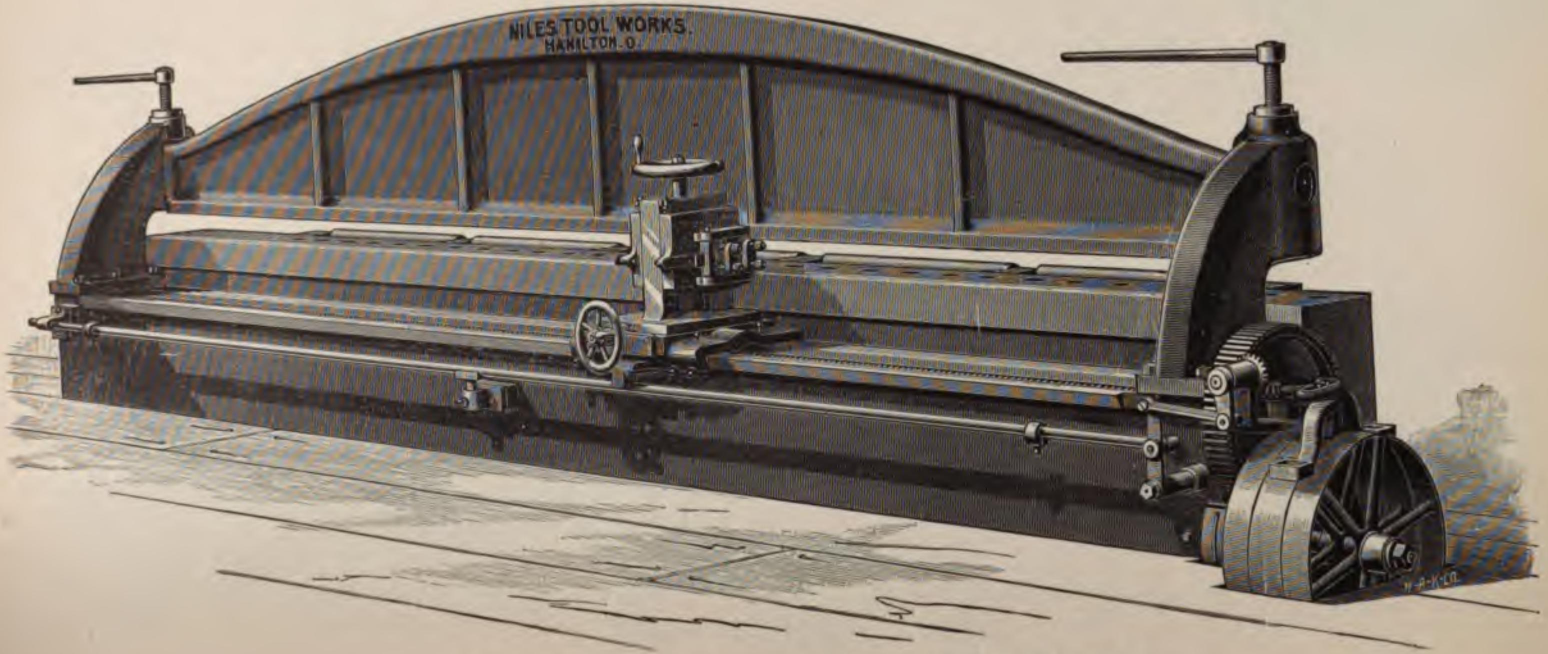

NILES TOOL WORKS.
HAMILTON, O.
W.A.K.CO.

PLATE PLANING MACHINE, WITH COMPOUND REST.

PLATE PLANING MACHINES.

Will Plane Plates of Any Length.

Designed for planing boiler plates. Will bevel the edge and square up a narrow caulking surface.

This machine will do much better work than can be done by hand, in much less time,and, consequently, at much less cost.

The work when done has a smooth, even and true finish. This machine will plane 14 feet to 20 feet long at one setting, and is arranged to plane any length by resetting the sheet.

There are two separate tools on the tool-post, arranged for easy and independent adjustment. The cut is taken both forward and back, so that no time is lost in reversing. A large steel screw operates the saddle.

Brackets extend out from the back ot the bed carrying rollers for supporting the sheet and facilitating handling. A heavy clamping-bar holds the plate securely in position. The bar is raised and lowered by screws at each end. No intermediate screws are required, hence the operation of setting is quickly accomplished.

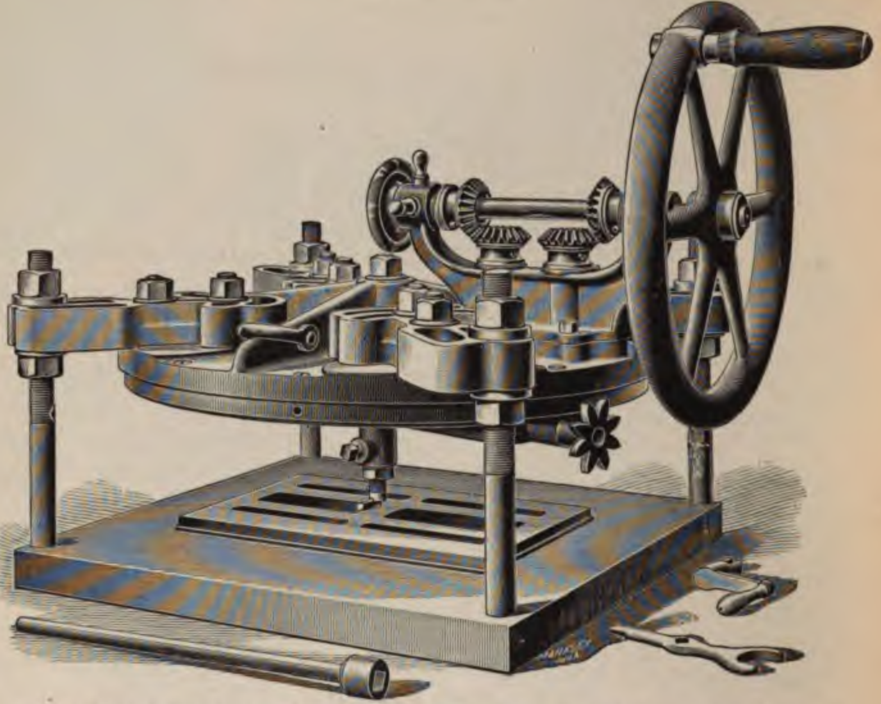
The machine illustrated is of great strength and power. The driving pulleys ars 24 inches diameter for a 2½-inch belt, and strongly geared to the screw. The screw is supported in a continuous bearing, preventing sag or deflection so injurious to both screw and nut. The nut is of extra length, surrounds three-fourths the diameter of the screw, and gives ample wearing service.

The counter-shaft pulleys are 24 inches diameter, 3¾ inches face. Speed, 300 revolutions per minute.

We have patterns for a large variety of heavy Plate Planing Machines for ship and boiler plates up to 2 inches thick, any length. Prices and data furnished on application.

SPECIFICATIONS.

Code Word.		Weight.	Price.
Mortuary	No. 1 Machine 14′ with plain rest.		$
Mosaic	No. 1 Machine 14′ with compound rest.		$
Moslem	No. 1 Machine 16′ with plain rest.		$
Mosque	No. 1 Machine 16′ with compound rest.		$
Mosquito	No. 1 Machine 18′ with plain rest.		$
Moth	No. 1 Machine 18′ with compound rest.		$
Motherly	No. 1 Machine 20′ with plain rest.		$
Motion	No. 1 Machine 20′ with compound rest.		$



PORTABLE VALVE-SEAT ROTARY PLANING MACHINE.

For Resurfacing Worn Valve-Seats.

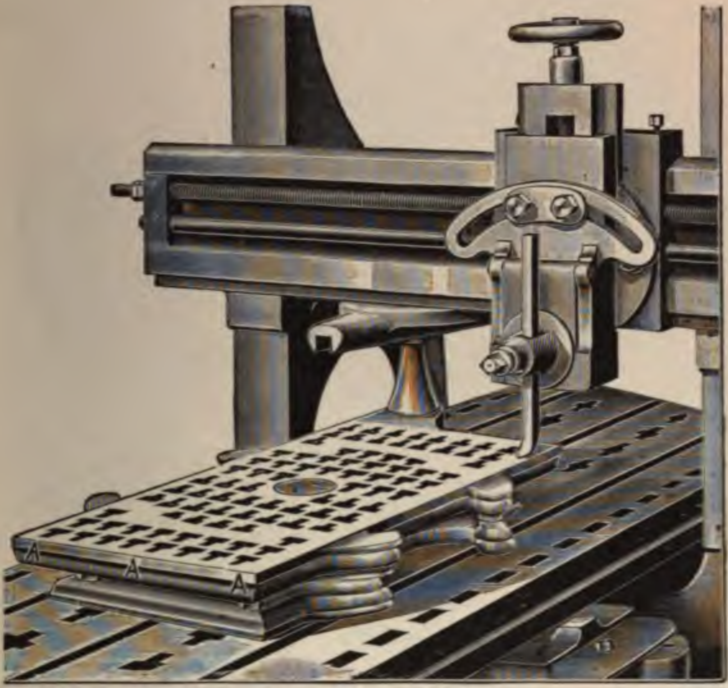
This machine is adapted to facing off the old valve-seats of locomotives and other engines in a manner at once expeditious and correct.

Great care has been taken to have the nuts and washers, that are furnished on the studs for holding the machine, clamp the radial arms so as not to spring the machines. In case the stud holes in a small seat should come inside the plates, four other radial arms are furnished with the machine, fitted with a T-slot, and with a hole at the other end corresponding to the hole for the old stud, thus affording facilities for extreme cases.

No more material need be removed than is absolutely necessary to true up thus saving the seat. The work is done by a continuous cut, and the loss of time from the return motion of the ordinary planer avoided. There is also no breaking out of the edges. It is estimated that an ordinary locomotive valve-seat can be trued up in two hours. These machines are strong and well fitted, are easily handled and will be found an excellent tool in every respect.

The 22-inch style is sufficient for all but the very largest class of locomotives. All the wearing surfaces are carefully scraped by hand, and the machines are thoroughly tested before being shipped from the works.

Code Word.		Price.
Fonascia	18-in. machine	$....................
Foncage	22-in. machine	$....................
Foncoir	26-in. machine	$....................



RADIUS LINK PLANER ATTACHMENT.

For Planing Links, Blocks and Circular Work on Ordinary Planer.

This attachment is used in planing curves of any radius, and perfectly parallel curves as applied to the ordinary planing machines. A pin projecting from a plate bolted to the table of the planer holds an upper table ("A") upon which the work is fastened.

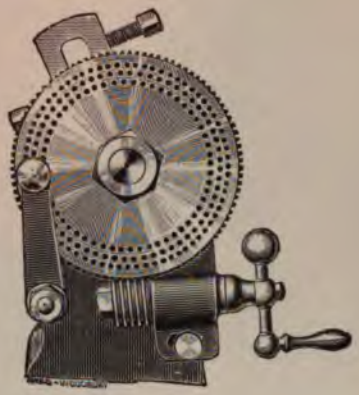
Thus the work may be moved forward and backward, and to a greater or less distance from the center pin, the amount of circular movement determining the radius of the circle to which the work is finished.

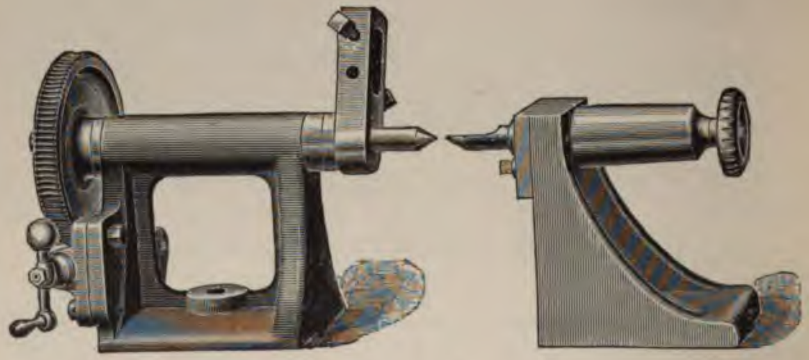
From the corner of the table ("A") a wrist projects upward and takes hold of a slide which is fastened at the required angle to the beam of the planer.

When the slide stands parallel to the bed of the planer, the table ("A") will move in a straight line. In proportion to the angle of the slide with the bed of the planer, the table ("A") will be deflected from a straight line into a true curve of greater or less radius.

Code Word, Foncailles.

Price, $......................





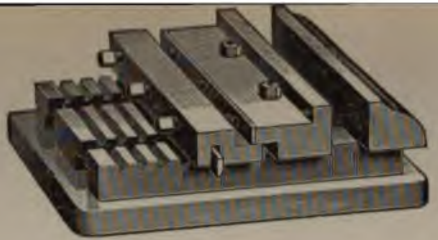
IMPROVED PLANER CENTERS.

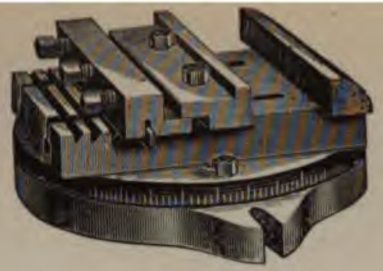
These planer centers have steel spindles and are well fitted and finished throughout. The worm which revolves the spindle is so arranged as to be moved out of gear when it is desired to use the index alone. The dials have three rows of holes of such numbers as to admit of a large range of work.

Code Word—Fonda, Price of 10-inch swing, $..................

Code Word—Fondassi, Price of 12-inch swing, $..................

Code Word—Fondatore, Price of 16-inch swing, $..................





PLANER CHUCKS.

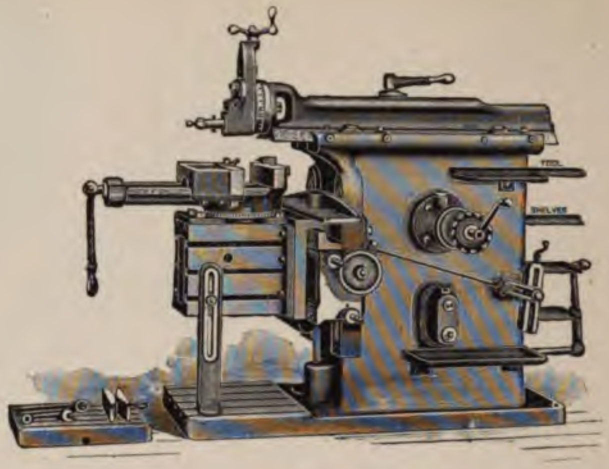
The chucks shown above are made in eight sizes, the first two of which have no T-slots. The 10-inch and 12-inch sizes can be supplied with two T-slots if desired, and the 15-inch to 30-inch sizes, inclusive, are made with either one or two slots. Unless otherwise specified those up to and including the 12-inch size will be furnished without any T-slots and those above this size with one slot.

SPECIFICATIONS.

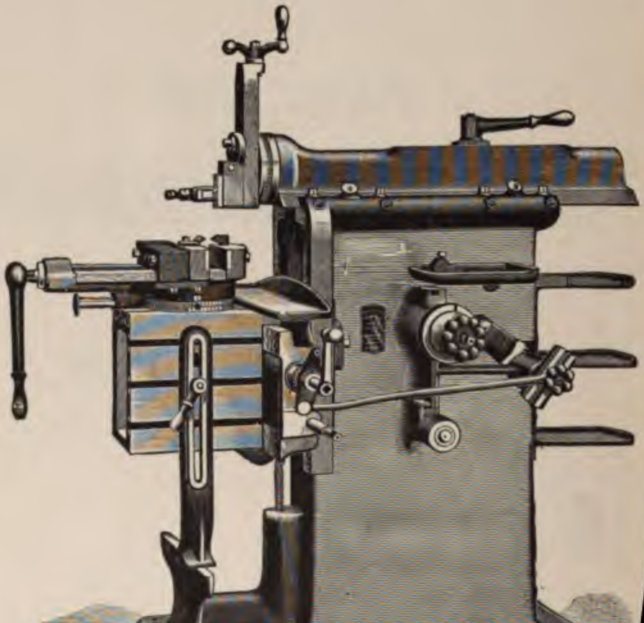
Square Base.						Round Base.							
Code Word.	Length of jaw.	Depth of jaw.	Weight of chuck.	Distance required between planer posts to take chuck.	Price.	Code Word.	Length of jaw.	Depth of jaw.	Jaw will open.	Weight of chuck.	Diameter of base.	Distance required between planer posts to take chuck.	Price.
Fondillos	6″	1¼″	66	11¼″	$20 00	Fondava.	6″	1¼″	3½″	84	10	11¾″	$25 00
Fondime.	8″	1⅞″	76	13½″	25 00	Fondavano ...	8″	1⅞″	5″	94	11¾″	14″	30 00
Fondisses....	10″	2¼″	100	15″	30 00	Fondeados...	10″	2¼″	6″	128	13½″	15⅛″	36 00
Fondista	12″	2¼″	140	17″	35 00	Fondearas.....	12″	2¼″	7″	158	16″	17½″	40 00
Fondling	15″	2½″	151	20″	45 00	Fondearian...	15″	2½″	9½″	251	18″	21″	50 00
Fondness......	18″	2⅝″	194	23″	55 00	Fondearon....	18″	2⅝″	11″	277	19½″	24″	60 00
Fondons.....	24″	2⅝″	300	28″	75 00	Fondello.......	24″	2⅝″	25″	475	25″	29″	90 00
Fondrier.......	30″	2¾″	400	32″	100 00	Fondibile.	30″	2¾″	32″	575	31″	34″	120 00

PART VIII.

SHAPING MACHINES.



“DOUBLE TRIPLE QUICK” STROKE SHAPER, WITH EXTENSION B



SINGLE GEARED SHAPER, WITH OUTSIDE SUPPORT TO

QUICK-RETURN STROKE SHAPERS, WITH EXTENSION BASE AND SUPPORT.

These shapers have an adjustable positive stroke with an extremely quick return. They will invariably plane to a line. The extension base and support to the table are patented—their value is obvious. A vise with graduated base, adjustable centers and square or taper jaws is supplied with them, together with face plate, countershaft, wrenches, etc.

SPECIFICATIONS.

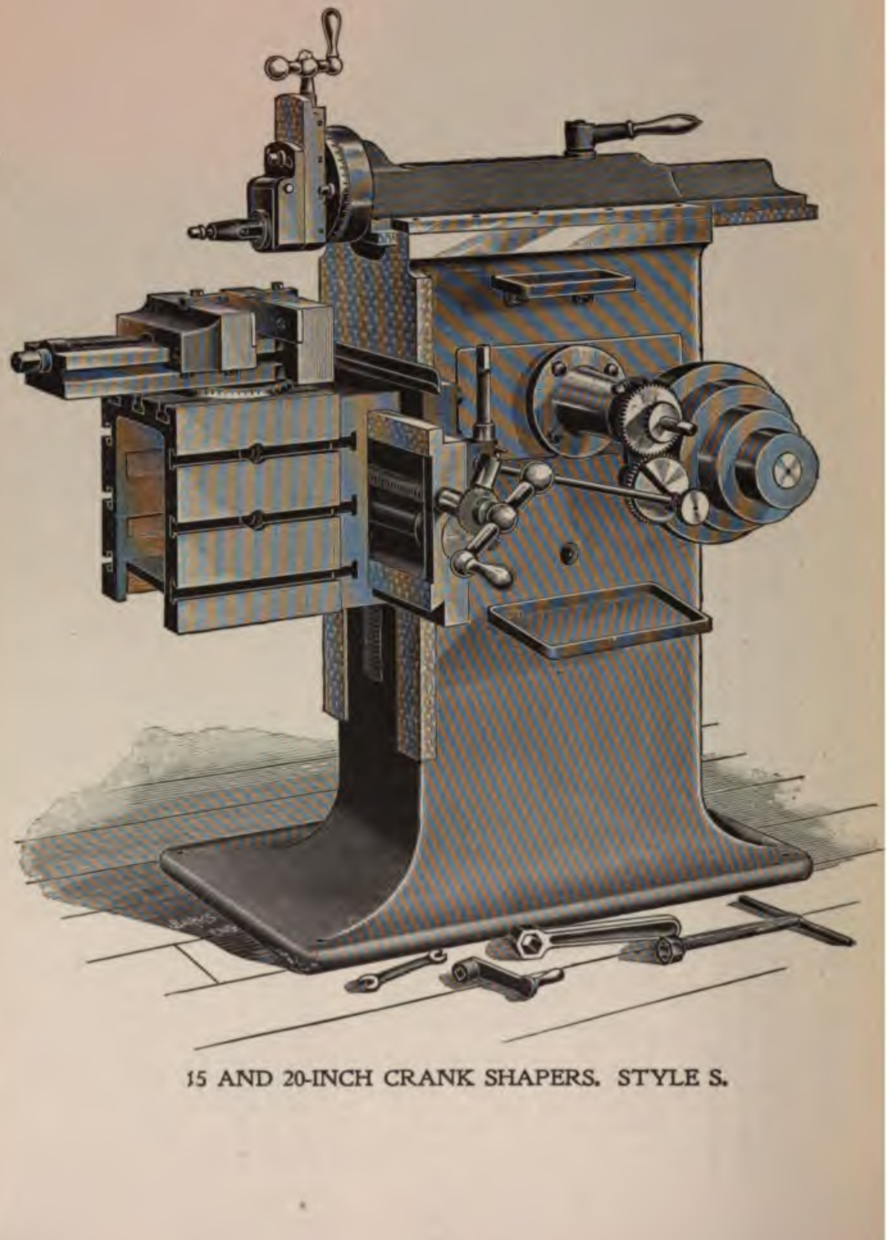
Code Word.	Planes—Inches.			Takes between Jaws.	Countershaft Pulleys.			Floor Space Required about	Weight about	Boxed Weight about	Cubic Feet about	Price.
	Stroke.	Width.	Height from Angle.		Diam.	Face.	Rev. Min.					
Forehood......	16″	20″	17″	10″	12″	3¼″	200	45x 81″	2300 lbs	2700 lbs	80	$.........
Forehorse.....	20″	20″	17″	12″	12″	3¼″	180	51x 78″	2500 lbs	30 0 lbs	105	$.........
Foreking	24″	25″	18″	15″	14″	3¼″	180	54x 99″	3500 lbs	4000 lbs	130	$..........
Foreknow....	26″	30″	15″	14″	14″	3¼″	200	54x101″	4600 lbs	5800 lbs	170	$............
Foreland	28″	30″	24″	16″	14″	4¼″	300	69x105″	5600 lbs	6600 lbs	220	$............
Forellen	32″	36″	24″	16″	16″	4½″	300	75x117″	7000 lbs	8500 lbs	260	$............

SINGLE GEARED SHAPERS, WITH OUTSIDE SUPPORT.

Like the extension base shapers, they have a positive stroke and will invariably plane to a line. On both styles a graduated index indicates the length of stroke, and the vises have provision for locking at right angles, while an automatic brake on the countershafts stops them quickly.

SPECIFICATIONS.

Code Word.	Planes—Inches.			Takes between Jaws.	Countershaft Pulleys.			Floor Space Required about	Weight about	Boxed Weight about	Cubic Feet about	Price.
	Stroke.	Width.	Height from Angle.		Diam.	Face.	Rev. Min.					
Forensibus ...	8″	14″	8″	6″	8″	2″	130	32x50″	900 lbs	1200 lbs	40	$..........
Forensic.....	12″	17″	10″	8″	9″	3″	130	36x54″	1200 lbs	1500 lbs	46	$... ....
Forepart.....	14″	17″	13″	8″	10″	3″	130	42x56″	1400 lbs	1700 lbs	60	$..... ....
Forepeaks.....	18″	20″	15″	10″	12″	3½″	130	45x60″	18 0 lbs	2200 lbs	80	$............



15 AND 20-INCH CRANK SHAPERS. STYLE S.

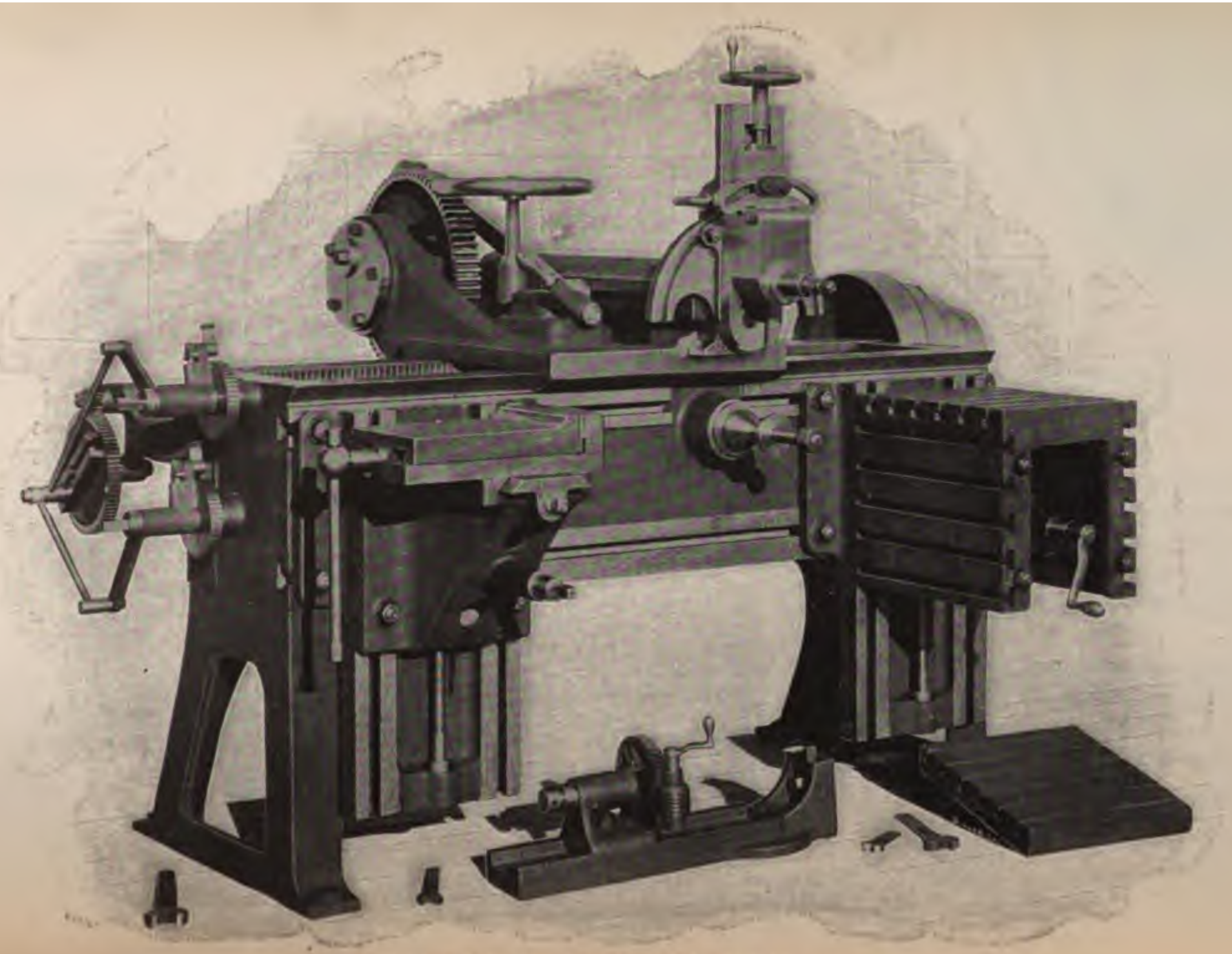
15 AND 20-INCH CRANK SHAPERS.

The cut represents a new 15 and 20-inch Crank Shaper. With the advantages offered, we believe them to be the most convenient, simple, strong and durable Shapers in the market. The stroke of these shapers can be changed and adjusted while running. Being operated by a crank motion, the stroke is at all times positive, and they willl invariably plane to a line, making it a particularly desirable tool for die makers where accurate work is required. The vice is swiveled, and may be transferred from the top of the table to the one side, adapting the machine to a larger range of work. Centers are furnished suitable for planing grooves in taps, reamers, or any light cylindrical work.

With each machine we furnish an improved box table. Work can be bolted upon the top and both sides. Being made in this form it has, in addition to the above advantages, a degree of stiffness not possessed by one-sided tables. It can also be utilized as a receptacle for tools, etc. The table may be removed and work bolted to the slotted apron to which box table is attached. This is desirable in planing the tops and sides of heavy pieces, such as legs of machines, etc. The machines are heavily geared, giving great power with high belt velocity. Gears are well proportioned, and are cut from the solid. All the bearings are accurately scraped to a fit; all studs and screws being made of steel.

SPECIFICATIONS.

Code Word.	Stroke.	Vertical adjust. of Table.	Traverse of Table.	Feed of Tool Block.	Bearing Column Slide Full Stroke.	Cone Belt.	Countershaft.			Weight.	Price.
							Diam. Pulleys.	Face.	Rev.		
Foregift........	12″	17″	16″	5″	21″	2″	12″	3″	240	1250	$........ ......
Foregoes	15″	18″	18″	5½″	22″	2″	10″	3″	240	1500	$ ....
Forehew	20″	22″	23″	6½″	25″	2¼″	12″	3″	260	2000	$....... ......



16-INCH TRAVELING HEAD SHAPING MACHINE.

NILES TRAVELING-HEAD SHAPING MACHINES.

Shaping Machines should be accurate in adjustment, capable of supporting heavy work, be uniform in stroke when once set, should reverse without lost motion or jar, and all parts should be conveniently handled because a great number of small operations are to be performed.

We meet these requirements by the long bed and traveling saddle; the two tables with strong supports; the crank-driven tool-bar with Whitworth quick return motion; and the facility with which the tool slide, main saddle, tables and vise may be instantly set to the position required.

For circular work a mandrel with clamping cones is placed near the middle of the bed and rotated by a worm and wheel with ratchet feed.

An attachment for holding light work on centers is also supplied to fit on the vise table, also a revolving square table to fit in the same place.

The Whitworth motion is the best quick return ever invented for this class of machines, because of its smooth action, durability and freedom from lost motion.

In all our shapers and crank-driven slotters we use this movement so adjusted that two-thirds of the time are consumed in the cutting stroke and one-third in the return.

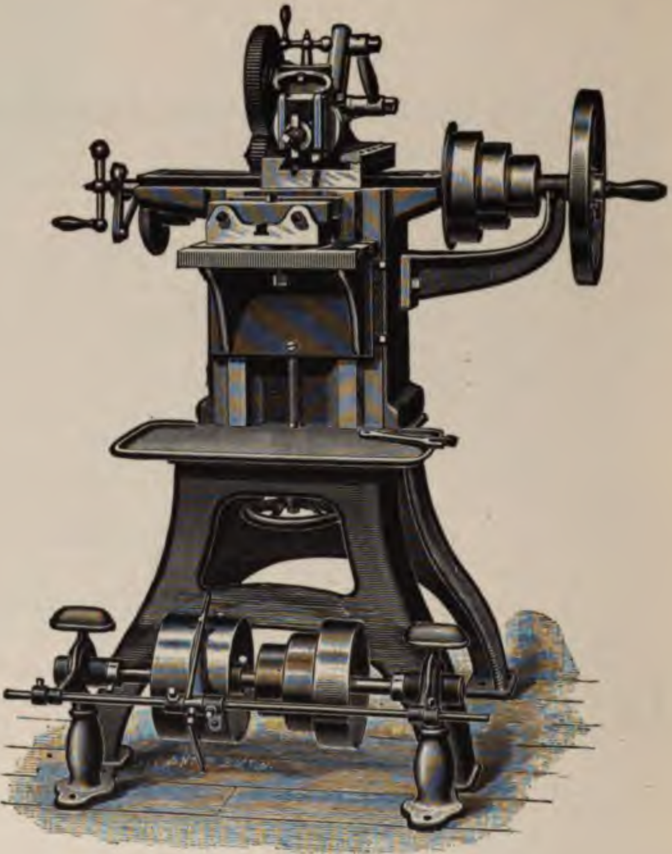
All sliding surfaces are scraped to a bearing by hand.

DIMENSIONS. SINGLE HEAD.

Code Word.	Stroke of Ram.	Length of Bed.	Traverse of Saddle.	Vertical Adjust of Table.	Counter Pulleys.			Weight.	Price.
					Diam.	Face.	Revolutions.		
Motto......	**16"**	6'	48"	18"	16"	4"	150	....	$........
Mound...	**18"**	7'	60"	18"	22"	8"	90 & 120	....	$........
Mourn.....	**24"**	8' 4"	70"	21"	18"	4"	250	....	$........

DOUBLE HEAD. Each Head Independently Driven.

Mould.. ...	**16"**	10'	48"	18"	16"	4"	150	....	$.......
Mountain	**18"**	12'	60"	18"	22"	8"	90 & 120	....	$.. .....
Mournful	**24"**	14'	70"	21"	18"	4"	250	....	$.......



SHAPING MACHINES.

This cut illustrates a useful shaper, made in three sizes. They will do work accurately and will be found complete in all their appointments; made of the best material and highest class of workmanship. The screws and other parts, where necessary, are case hardened. The feed is automatic and reversible. The cutter-bar has a graduated swivel head. The table is adjusted by means of a screw and wheel under table on the six and eight inch, and by a crank at the side on the ten inch. They will take a stroke to their full capacity, and can easily be adjusted to any less distance required.

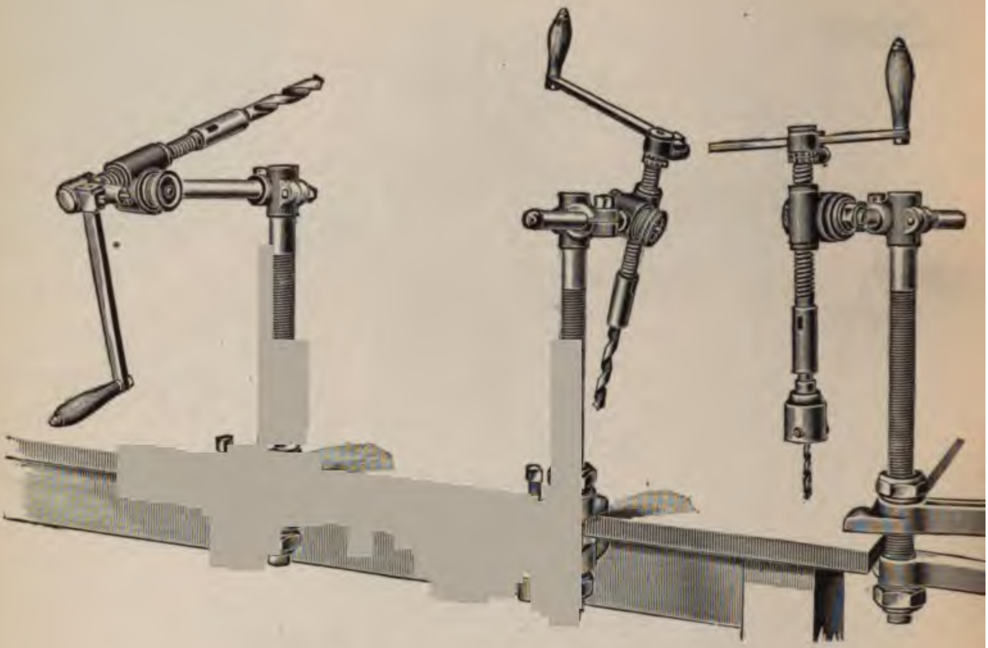
A swivel chuck is furnished with each machine, also a plain chuck taking work full length of traverse when wanted.

SPECIFICATIONS.

Code Word.	Length of Stroke.	Length of Traverse.	Greatest Distance between Tool and Table	Cone Pulleys Three Steps.		Countershaft Pulleys.		Rev. of Countershaft.	Weight.	P
				Diameter Inches.	Face.	Diam.	Face.			
Foredo	6″	9″	8″	3, 4½ & 6″	1¾″	6″	2½″	220	450	$..
Forefeel...	8″	12″	10″	4¾, 6⅜ & 8″	2¾″	8″	2½″	100	750	$..
Forefoot...	10″	15″	18″	4¾, 6⅜ & 8″	2¾″	10″	2½″	100	1000	$..

PART IX.

DRILLING MACHINES.



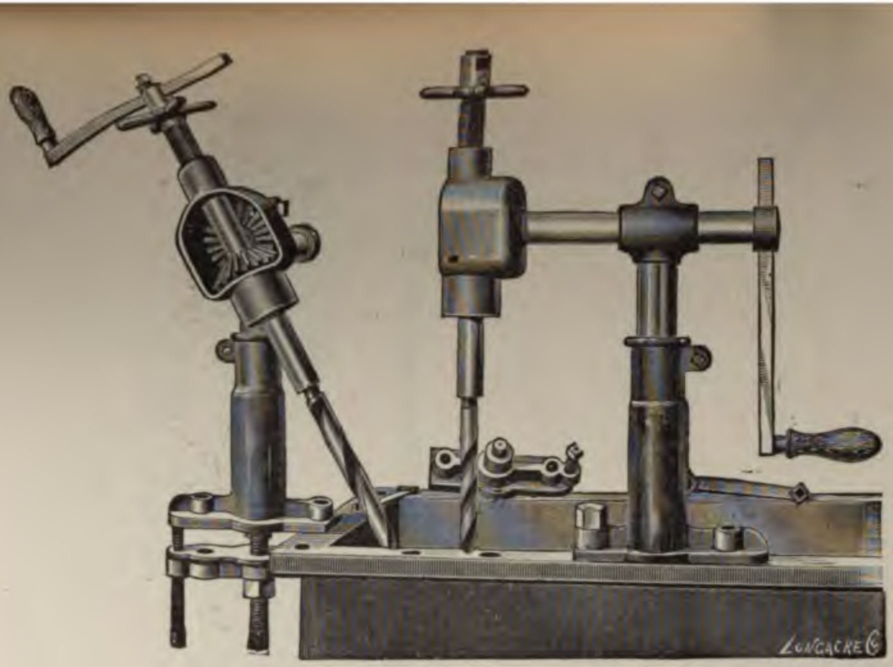
UNIVERSAL AUTOMATIC FEED HAND DRILL.

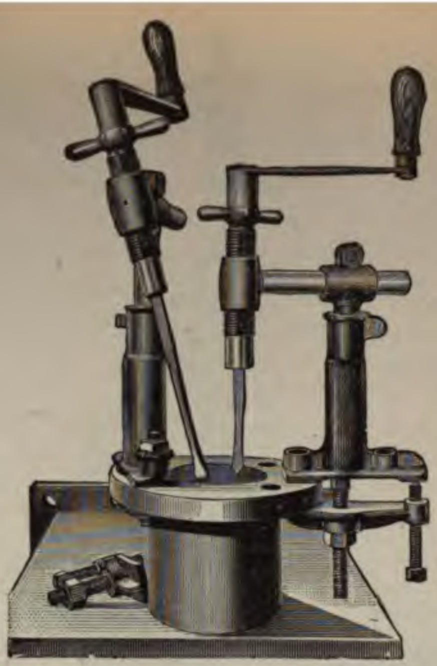
This drill is so constructed that it can be worked by a crank or as a ratchet, and, being "Universal," can be set at any conceivable angle. The feeding of the drill spindle is automatically regulated, according to the nature of the metal being operated on and the size of feed desired. The feed motion consists of a friction disk in connection with a worm gear, which operates in the thread on the drill spindle and advances the tool with a greater or less rapidity. The speed of the feed is changed by tightening or loosening the friction wheel.

LIST OF PRICES ON UNIVERSAL AUTOMATIC FEED HAND DRILLS.

Code Word.	No.	Capacity.	Taper Socket.	Straight Socket.
Fondatezza	1	19-32″	$28.00	$26.00
Fonderemmo	2	1 29-32″	34.00	32.00
Fondereste	3	1¼″	42.00	40.00
Fondiamo	4	1½″	52.00	50.00

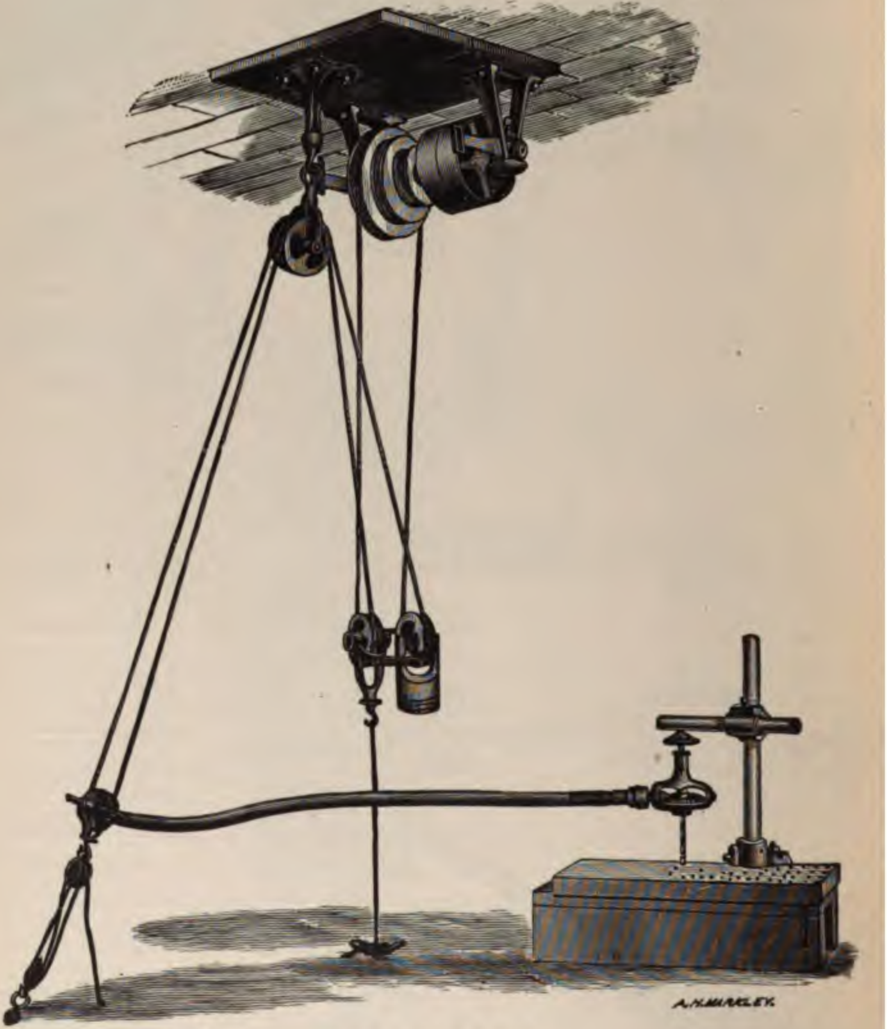
Drill chucks to fit socket of spindle and take all sizes of twist drills from one-half inch down, $8.00 each.





HAND DRILLS.—SPECIFICATIONS.

Code Word.	No.	Will Drill Holes.	Reach.	Traverse of Spindle.	Vertical Adjust of Post.	Morse Taper.	Net Weight.	Weight Boxed for Export.	Price.
Fondront......	1	½"	6½"	2½"	4"	1"	11 lbs.	25 lbs.	$ ....
Fondsen	2	⅞"	9½"	3½"	5"	2"	33 lbs.	55 lbs.	$ ....
Fondule........	3	1¼"	12"	4"	5"	3"	50 lbs.	95 lbs.	$ .. ..



PORTABLE DRILL.

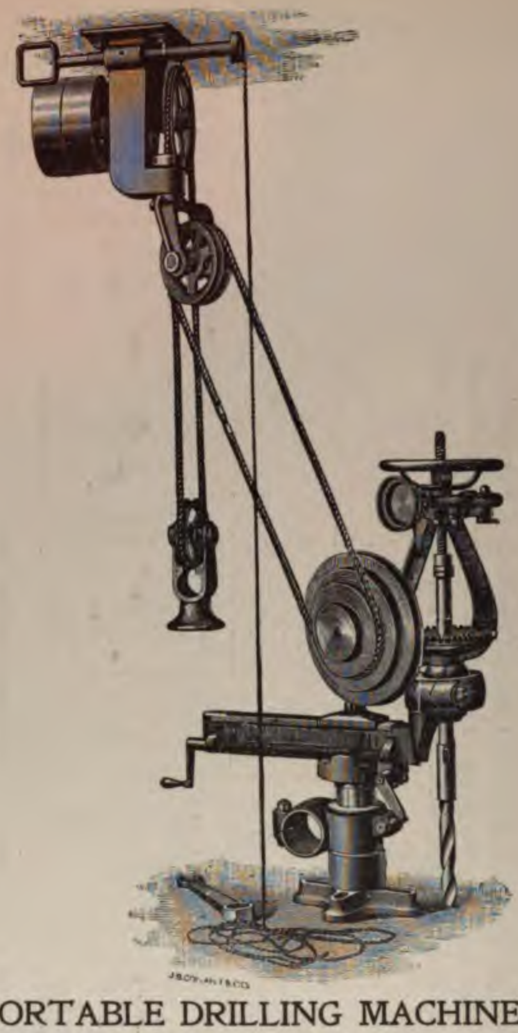
PORTABLE DRILLING MACHINES.

The cut opposite represents a complete Portable Drill Plant consisting of flexible shaft, countershaft, drill press, roundabout, etc. The roundabout or idler pulleys are made very large, thus giving an extra amount of power. As will readily be seen, this is a most useful arrangement for doing a vast amount of drilling ordinarily accomplished by means of a hand ratchet, as it can be set in any possible position.

PRICE LIST OF PORTABLE DRILLS.

Code Word Complete Machine.	Size No.	Flexible Shafts.	Drill Presses.	Pedestal Drill.	Breast Drill.	Roundabout.	Counter Shaft.	100 foot Rawhide Belt.	Three Pair Couplings.	Price Complete	Capacity About.	Speed of Counter shaft About.	Shipping weight about.
Fonfone.....	3	$ 30.00	....	....	$12.00	$10.00	$10.00	$20.00	$ .75	$ 82.75	Drills to ¼"	2 00	130 lbs
Fongible....	4	40.00	....	....	14.00	10.00	10.00	25.00	.75	99.75	" ½"	6 50	140 "
Fongicole .	4	40.00	$20.00	....	....	10.00	10.00	25.00	.75	105.75	" ¾"	4 50	230 "
Fongivore..	5	50.00	25.00	....	....	20.00	20.00	30.00	1.00	146.00	" $\frac{15}{16}$"	4 50	250 "
Fongoide ..	6	60.00	25.00	....	....	20.00	20.00	30 00	1.50	156.50	" 1¼"	4 40	265 "
Fonico.......	8	80.00	30.00	....	....	20.00	20.00	38.00	2.25	190.25	" 1⅝"	4 25	310 "
Fonicelina.	9	100.00	30.00	....	....	20.00	20.00	38.00	2.25	212.25	" 2 "	4 00	340 "
Fonkelde ..	8	80.00	....	$55.00	....	20.00	20.00	38.00	2.25	215.25	" 2½"	4 25	340 "
Fonkeling..	9	100.00	....	55.00	....	20.00	10.00	38 00	2.25	237.25	" 3 "	3 75	370 "

Speed of counters only approximated; should be governed according to material drilled. When desired we can furnish braided cotton rope in place of rawhide at a slight reduction in cost, but we do not recommend it.



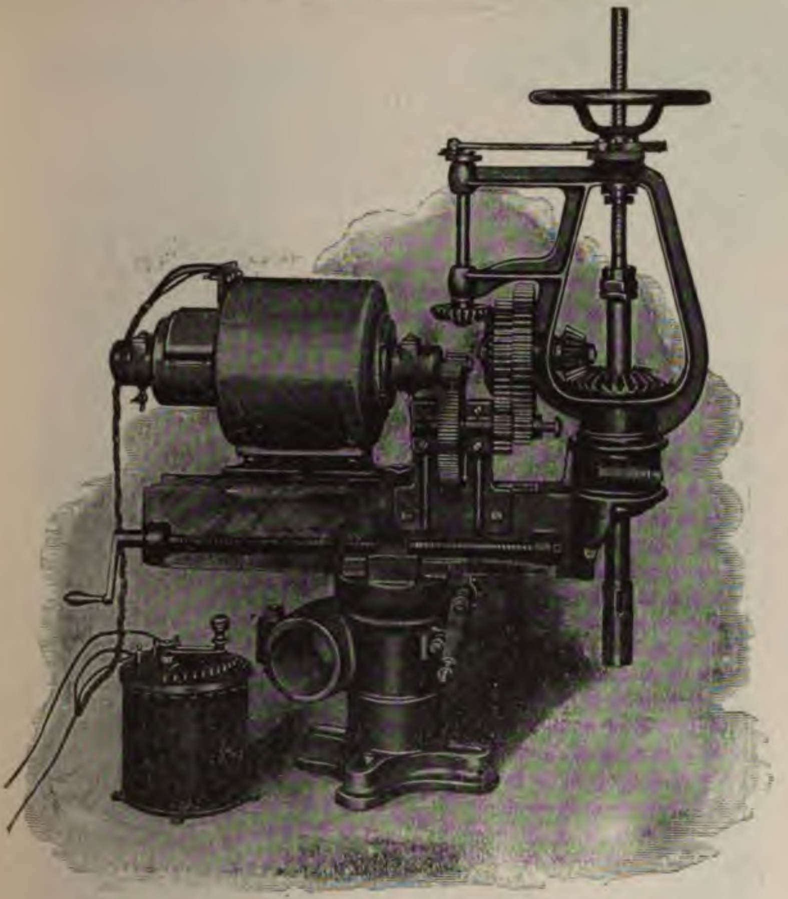
PORTABLE DRILLING MACHINES.

The base of these drilling machines is intended to be bolted or clamped to the piece to be drilled. The height of the post can be adjusted to suit the different lengths of drills and chucks used in the spindle.

The radial arm is adjustable in direction of its length, and can be rotated about the post.

SPECIFICATIONS.

Code Word.	Size.	Reach.	Will Drill.	Spindle Traverse.	Morse Taper.	Countershaft Pulleys.			Weight Complete.	Price Machine.	Counter Hanger
						Diam.	Face.	Revs.			
Fonneuse...	A	12″	¾″	4″	2	9″	2½″	200	225	$ 60	$30
Fonolite....	B	16½″	1″	5½″	3	9″	2½″	200	250	85	30
Fonologia...	1	16½″	1″	5½″	3	10″	3″	200	300	130	35
Fonomania.	2	21½″	1½″	5½″	4	10″	3″	200	500	165	35
Fonometro.	3	21½″	2″	8″	4	10″	3″	200	550	195	35
Fononusi ...	4	28″	3″	13″	4	10″	3″	200	700	265	35
Fontaine...	5	36″	....	22″	5	16″	3½″	150	1400	450	55



PORTABLE ELECTRIC DRILL, No. 4.

The above cut represents one of the latest designs in portable drilling machinery, and is intended for use in all places where shafting is not accessible and where direct electric current can be obtained.

The arm of the machine carries a water and dust-proof motor of the Storey pattern, which is direct geared to the press proper.

By means of a clutch-pin in the back gear, a speed suitable for one and two-inch drills can be obtained instantly; the intermediate speeds are obtained by a starting and controlling box. In the arrangement, the motor is running at its normal speed when doing its heaviest work.

The machine has a feed arrangement for both drilling and boring.

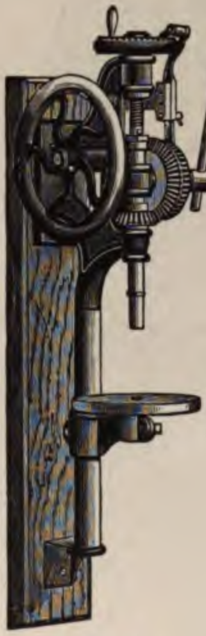
The arm is moved in and out by a screw and rotated about the post by a worm and tangent wheel.

The spindle contains a No. 4 Morse taper socket, has a feed of 9 inches and will drill up to 2 inches in diameter in steel.

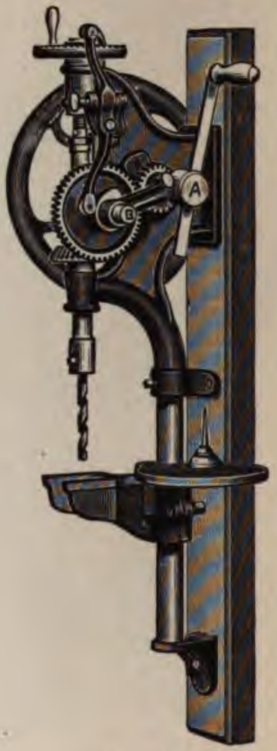
Net weight of machine is 700 pounds.

These machines can be supplied with motor wound for either 110 or 220 volt circuit.

Code Word, Foraminato.



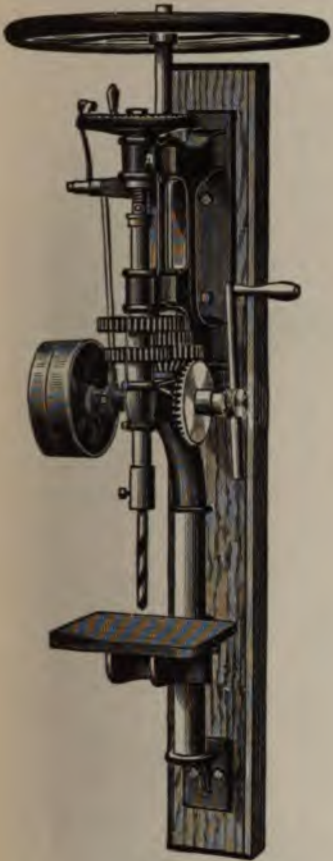
No. 0.



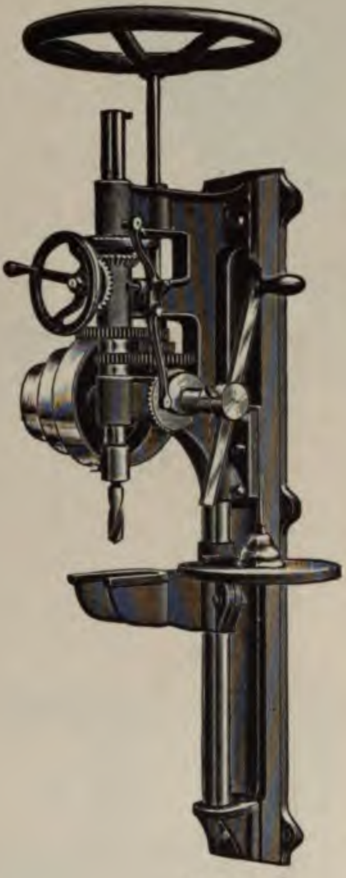
No. 1½.

"POST" OR "BLACKSMITH" DRILLS.

The small drills illustrated herewith are samples of a large line of low priced machin drilling from the smallest holes up to 1½ inches inclusive. The gearing is cut from the and they are well fitted throughout. They can be operated by hand or by power wh ordered. Tabulated information relative to these machines will be found on opposite page



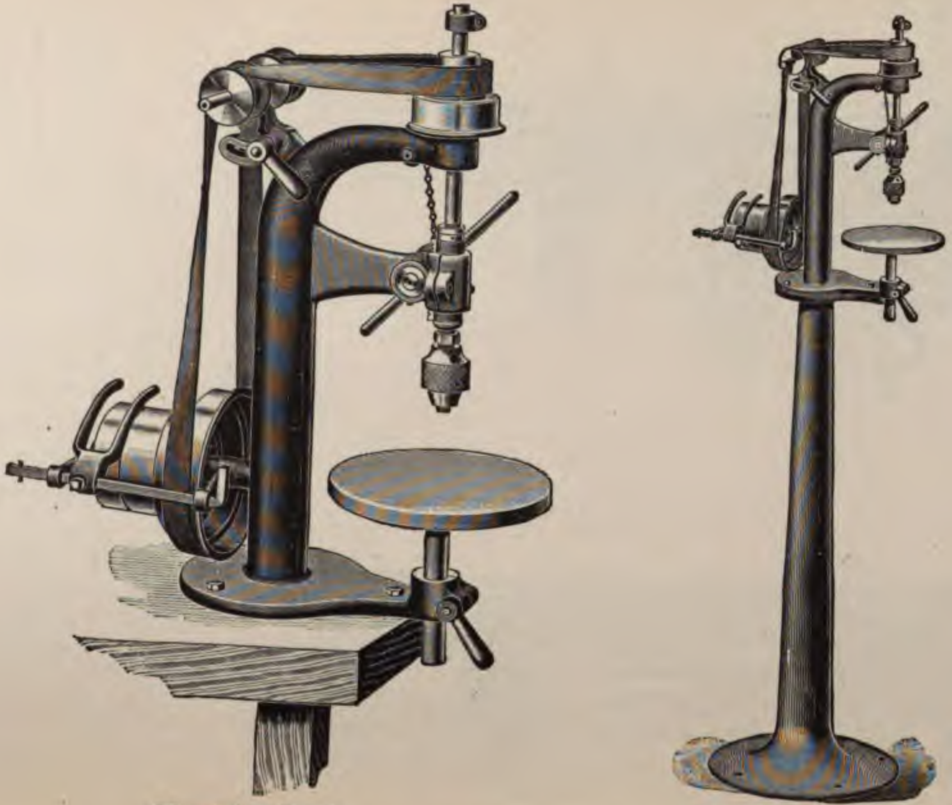
No. 3.



No. 4

SPECIFICATIONS.

Code Word with T & L Pulleys.	No.	Swing.	Size Shank.	Will Drill.	Length	Weight	Price.	Price with Cone and Counter.	
Fontalis	0	6″	¼″	⅜″	26″	30	$20	....	See Illustration.
Fontalium.....	1	10½″	½″	1″	42″	100	28	....	
Fontanales....	1½	11″	½″	1¼″	44″	120	34	....	See Illustration.
Fontanella....	2	15″	½″	1½″	54″	160	48	....	
Fontaneria ...	3	21″	41/64″	1½″	66″	285	75	....	See Illustration.
Fontange	4	17½″	41/64″	1½″	54″	250	70	....	Iron Back See Illustration.
Fontanino	5	9″	41/64″	¾″	44″	115	20	....	Horizontal Bench Drill.
Fontanone....	6	11″	½″	1″	42″	114	30	....	Tubular Iron Column.
Fontanoso ...	7	15″	½″	1½″	52″	200	52	....	Tubular Iron Column.
Fonteinen.....	8	10″	½″	¾″	33″	55	12	....	Bench Drill Vertical.
Fonticola......	9	10″	½″	1″	33″	75	15	....	Bench Drill Vertical
Fonticolis.....	The Boss	11″	½″	⅞″	44″	110	25	....	Horizontal Vertical.



Mounted on Bench. Mounted on Column.

10-INCH SENSITIVE BENCH DRILL.

10-INCH SENSITIVE BENCH DRILL.

This tool is designed for light rapid drilling up to 5-16" holes. It is the result of several years' experience with this class of drills, and it is especially adapted for the use of manufacturing jewelers, electricians, mathematical instrument makers, and for light drilling generally.

The spindle is driven by a 1-inch flat belt. It has two speeds, a cut steel rack and pinion feed, and an adjustable stop to gauge the depth of holes. It is entirely relieved of belt strain, and is counter-balanced by a weight, inside of frame, making it extremely sensitive and uniform to the touch. It is also provided with means for taking up wear or lost motion, and has a nut above the taper for removing the chuck. (See cut.)

Unless ordered otherwise the machines are sent with the spindles fitted to the 5-16 "Almond, and the 11-32 "Skinner" drill chucks. The taper holes in both the "Skinner" and the "Almond" chucks are the same.

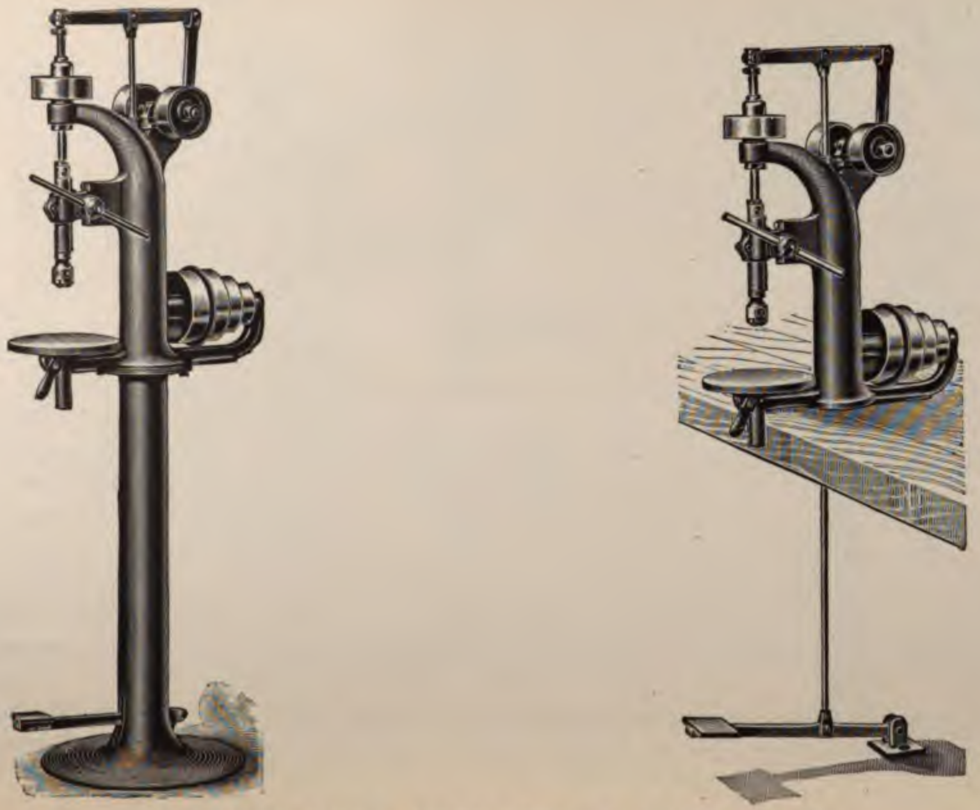
The countershaft is attached to the frame and can be placed directly under the line-shaft, thus avoiding the trouble and expense of putting up a countershaft.

Speed: It can be run at a very high rate of speed, as the pulleys are turned inside and out and all the rotary parts are perfectly balanced.

SPECIFICATIONS.

Code Word.	Diam. Table.	Distance Spindle.		Vertical Movement.		Will Drill to	Countershaft.			Weight.	Weight with Column.
		To Table.	Center to Frame.	Spindle.	Table.		Diam Pulleys.	Face.	Rev.		
Fontyn.	8"	7½"	$5\frac{1}{16}$"	2½"	7"	$\frac{5}{16}$"	4"	1⅛"	....	45	110

Price of Machine without column or chuck.........	$25.00
" Column, extra..	7.50
" Almond or Skinner Chuck, extra...........	5.50



SENSITIVE DRILL, OPERATED BY FOOT LEVER.

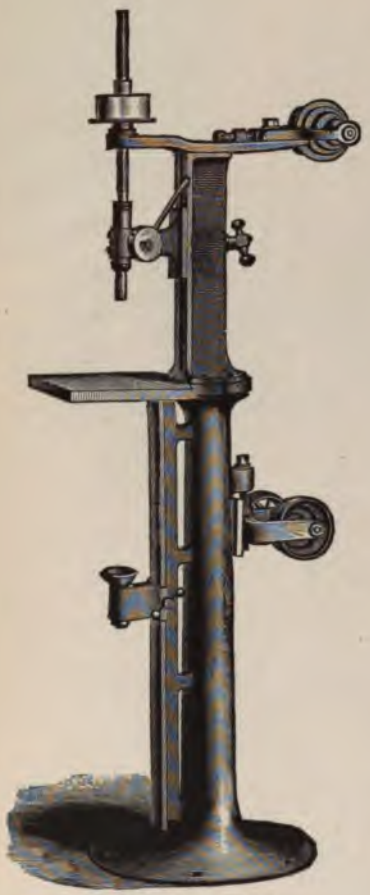
13-INCH SENSITIVE DRILL, OPERATED BY FOOT LEVER

This drill has large drilling capacity for a tool of its class, drilling ½-inch holes and under. It has the special feature of throwing the spindle its entire run of 5 inches by a foot lever. This leaves both hands free to hold the work. The hand lever can also be used when wanted. Each drill is provided with a universal chuck that will hold ½-inch drills. The chuck tightens with a key, and the spindle does not have to be held in order to tighten the chuck. The chuck screws on the end of spindle, and drill sockets, with any size hole, can be put on in place of the chuck.

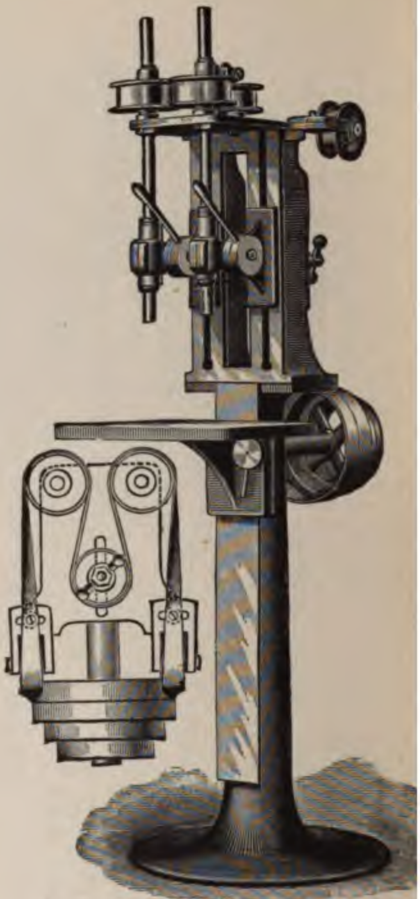
SPECIFICATIONS.

Code Word.	Swing.	Will Drill.	Greatest Distance Table to Chuck.	Vertical Throw of Spindle.	Vertical Adjustment of Table.	Width Cone Belt.	Countershaft.			Weight with Countershaft.	Price with Countershaft.
							Diam. Tight and Loose Pulleys.	Face.	Rev.		
Foodful..............	13″	½″	8″	5″	5″	2″	8″	2½″	....	170 lbs.	$.............

Price given in table includes chuck and foot lever.
Price of column, extra, $.................. ....
Weight complete with column, 260 pounds.



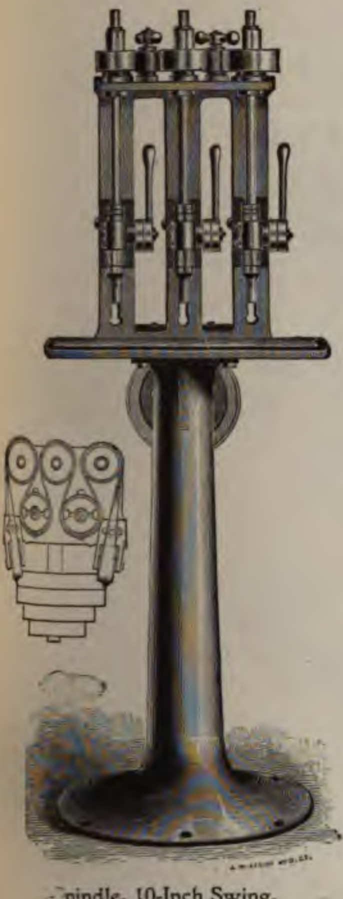
No. 1 10-Inch Swing.



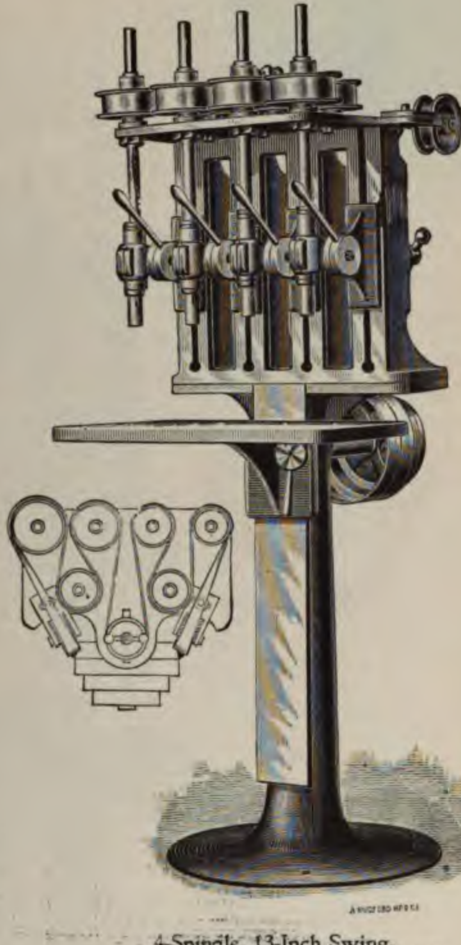
2-Spindle, 13-Inch Swing.

SENSITIVE DRILLS.

The spindles of the accompanying drills are driven by one continuous belt, securing m desirable results, especially the uniform running of all the spindles. A suitable tightening pu is provided for taking up slack. The spindle is not subjected to any lateral strain, or any dency to wear its bearings out of round, as the driving pulley has a long hub with independ bearings, and its rotation is transmitted to the spindle through a suitable key. The weight the foot lever, spindle and chuck is counterbalanced by a flat coil spring. For specificati see page 131.



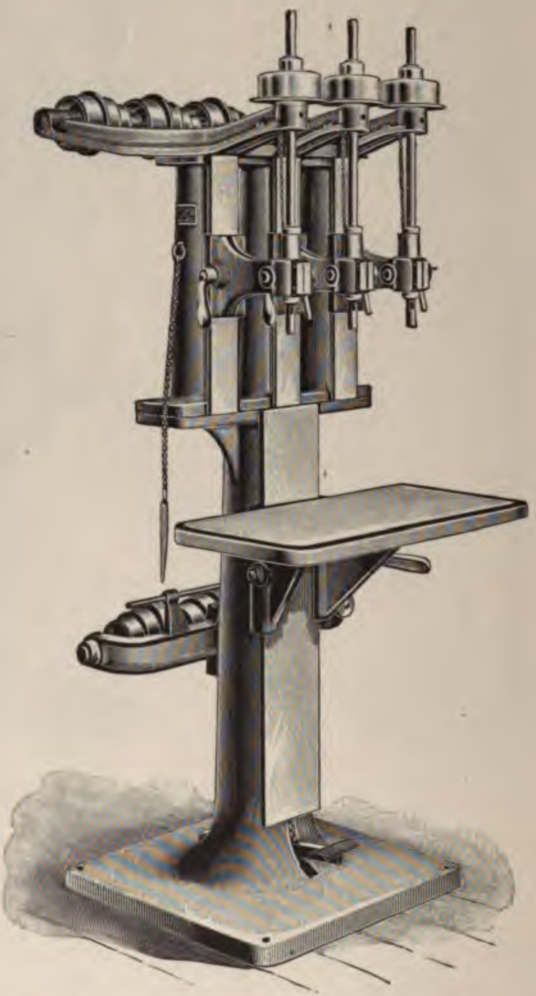
-Spindle, 10-Inch Swing.



4-Spindle, 13-Inch Swing.

SPECIFICATIONS.

Code Word.	No. Spindles.	Swing.	Will Drill.	Distance Between Spindles.	Countershaft Pulleys.			Weight	Price.	
					Diam.	Face	Revs.			
Fooleries...	1	10''	5/16''	....	4¼''	1⅝''	400	150	$ 54	Bench
Fooling......	1	10''	5/16''	....	4¼''	1⅝''	400	275	70	....
Fooltrap ...	2	10''	⅜''	6''	8''	2¼''	275	360	108	....
Footbanks..	3	10''	⅜''	6''	8''	2¼''	275	500	145	....
Footgeld...	4	10''	⅜''	6''	8''	2¼''	275	575	180	....
Foothot....	1	13''	½''	....	4¾''	1¾''	350	175	60	Bench
Footman....	1	13''	½''	....	4¾''	1¾''	350	330	80	....
Footmarks..	2	13''	½''	6''	8''	2¼''	250	375	120	....
Footpace.....	3	13''	½''	6''	8''	2¼''	275	470	160	....
Footpaths...	4	13''	½''	6''	8''	2¼''	275	650	200	....
Footplows..	1	15''	⅝''	....	6''	2⅛''	175	450	100	....



14-INCH SWING SENSITIVE DRILL—LEVER FEED.

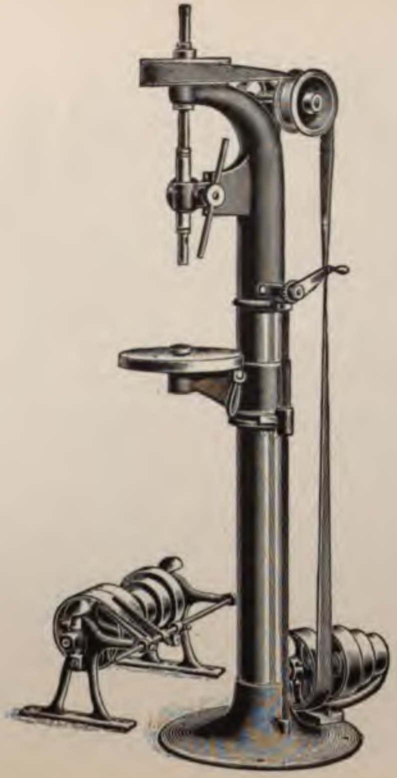
FOURTEEN-INCH LEVER FEED SENSITIVE DRILL.

WITH INDEPENDENT BELTED SPINDLES.

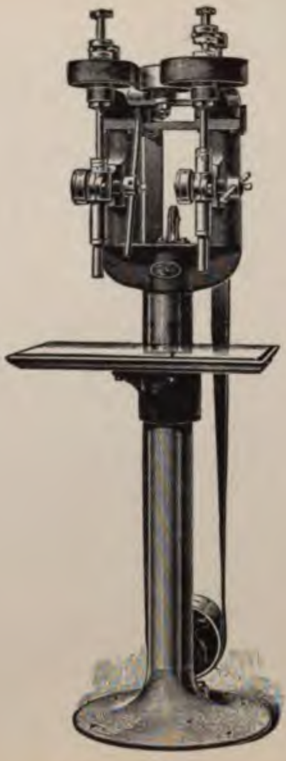
The cut illustrates the 3-spindle style. In the design of this tool ample weight of metal is provided to make frame rigid and stiff in every part, also large driving shafts with generous length of bearings. In spindle sleeve is an inset steel rack ⅝ inch face. The upper spindle bearing is a cast-iron sleeve made fast to frame. The strain or tension of spindle belts come on stud and not on spindle direct. The spindle is counterbalanced by weight, which is readily reached in case it is desired to add or reduce the counterbalance. Note extra length between rear bearings. The belt shifting device is operated by the foot treadle in front of column, by means of which the operator can stop or start machine without loosening hold of work. The drill user will appreciate this improvement. In connection with cones will give a spindle speed of 900 revolutions per minute for fast and 365 revolutions for slow speed.

SPECIFICATIONS.

Code Word.	Number of Spindles	Diameter of Spindles.	Morse Taper.	Traverse of Spindle.	Distance Center of Spindle to Face of Slide.	Width of Cone Belt.	Size of Table.	Size of Base.	Countershaft.			Shipping Weight.	Price.
									Diam. of T & L Pulleys.	Face.	Revs.		
Foppende	2	1 3/16"	No. 1	2⅝"	7"	1½"	19"x12½"	20" x 24"	6"	2⅜"	425	525 lbs	$........
Foppishly	3	1 3/16"	No. 1	2⅝"	7"	1½"	26"x12½"	24" x 24"	8"	2⅜"	425	870 lbs	$........
Fopling...	4	1 3/16"	No. 1	2⅝"	7"	1½"	33"x12½"	24" x 24"	8"	2⅜"	425	1025 lbs	$........



13-Inch Drill Press.



2-Spindle Drill Press.

SENSITIVE DRILL PRESSES, STYLE B.

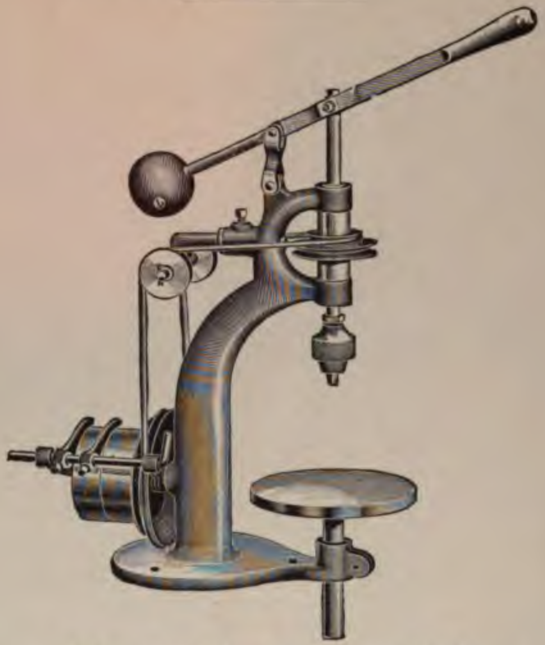
SENSITIVE DRILL PRESSES.

STYLE B.

The drill presses shown opposite have an independent countershaft belting to the foot of the drill. The tension of the spindle belt is never on the spindle. The table can be brought to its exact position by the srcew shown in the cut, and is free to swing either way. In the multiple spindle drills each spindle has an independent stop motion which enables the operator to stop or start the spindles without stopping the machine. Stop collars for drilling to depths are furnished. Also collars to stop the spindles from rising higher than necessary. Tables are counterbalanced by weight inside of the column.

SPECIFICATIONS.

Code Word.	No. of Spindles.	Swing.	Will Drill	Size of Spindle Pulleys.	Size of Table.	Will Drill to Center.	Countershaft.			Weight.	Price.
							Diam Pulleys	Rev.	Rev.		
Foppen....	1	13″	0 to ⅝″	8″	11¾″	13″	8″	3″	300	350 lbs.	$............
Foppish..	2	16″	″	6 & 8″	12″x	16″	8″	3″	300	450 lbs.	$............
Fopptest..	3	13 & 22″	″	4½, 6 & 8″	12x32″	13&22″	8″	3″	300	550 lbs.	$............
Fopster....	4	14 & 25″	″	5, 6, 7 & 8″	12x38″	14&25″	8″	3″	300	700 lbs.	$............



SENSITIVE DRILL PRESS.

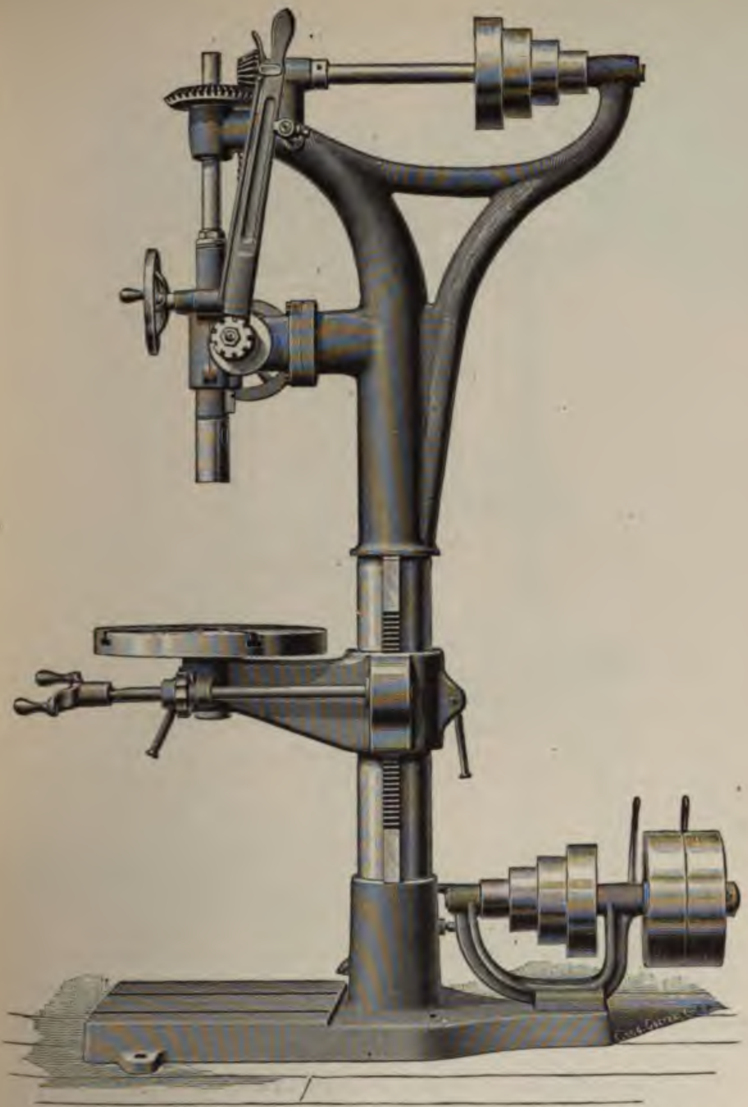
For drilling holes ¼-inch and smaller. The spindle is ⅝-inch in diameter, and is provided with thread and nut to force chuck off. Upper end of spindle has spring nut, collar, and fiber washer for thrust bearing. Weight of spindle and chuck is counter-balanced by adjustable ball on lever handle. The lever is connected to the spindle by pointed and hardened screws which enter collar and are locked in position by check nuts. This connection is simple, adjustments for months of wear are provided and if set up properly there can be no excuse for back lash or lost motion between lever and spindle.

The spindle bearings consist of two brass gun-metal bushings, which are forced in the arms of frame casting. The spindle is splined and is driven by key in the hub of a two-speed pulley. This pulley runs on the outside of gun-metal bushings referred to above, thus relieving the spindle of all belt tension.

SPECIFICATIONS.

Code Word.	Swing.	Will Drill.	Distance Spindle to Table.	T & L Pulleys.		Weight.	Price.
				Diam.	Face.		
Fontinalis.....	9″	¼″	8″	4″	1¼″	....	$......... ....

Price Column 36″ high, extra.......... ....$..........................
" Almond 3/16″ to 0 drill chuck, extra........., ...$..........................
" Skinner 3/16″ to 0 drill chuck, extra......... ....$..........................

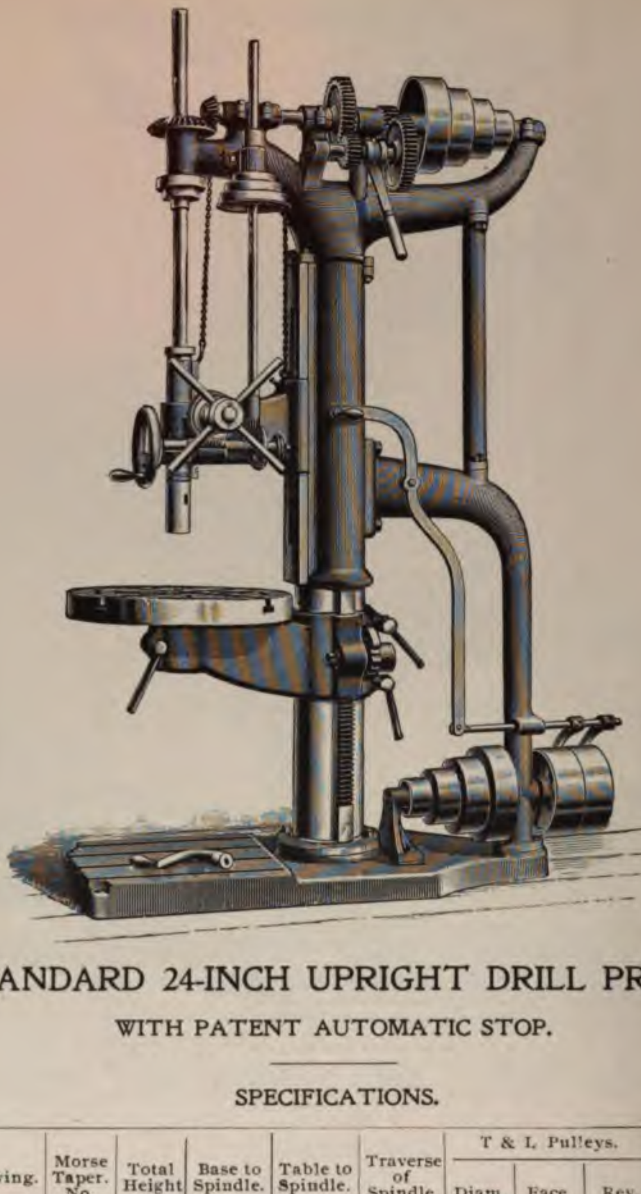


21-INCH WHEEL AND LEVER DRILL PRESS.

SPECIFICATIONS.

Drill to center of	21 in.
Height over all	6 ft.
Takes in between base and spindle	40 in.
Takes in between table and spindle	20 in.
Traverse of table	16 in.
Hole in spindle fits Morse Taper No. 3.	
Diameter of spindle	1 5-16 in.
Code Word	Forabile
Traverse of spindle	8 in.
Diameter of column	5¼ in.
Diameter of table	16¾ in.
Diameter of driving pulley	9 in.
Face of driving pulley	2½ in.
Changes of speed. cone driving pulley	4
Revs. of lower shaft per minute	300
Weight, about	660 lbs.

Price, $ ....



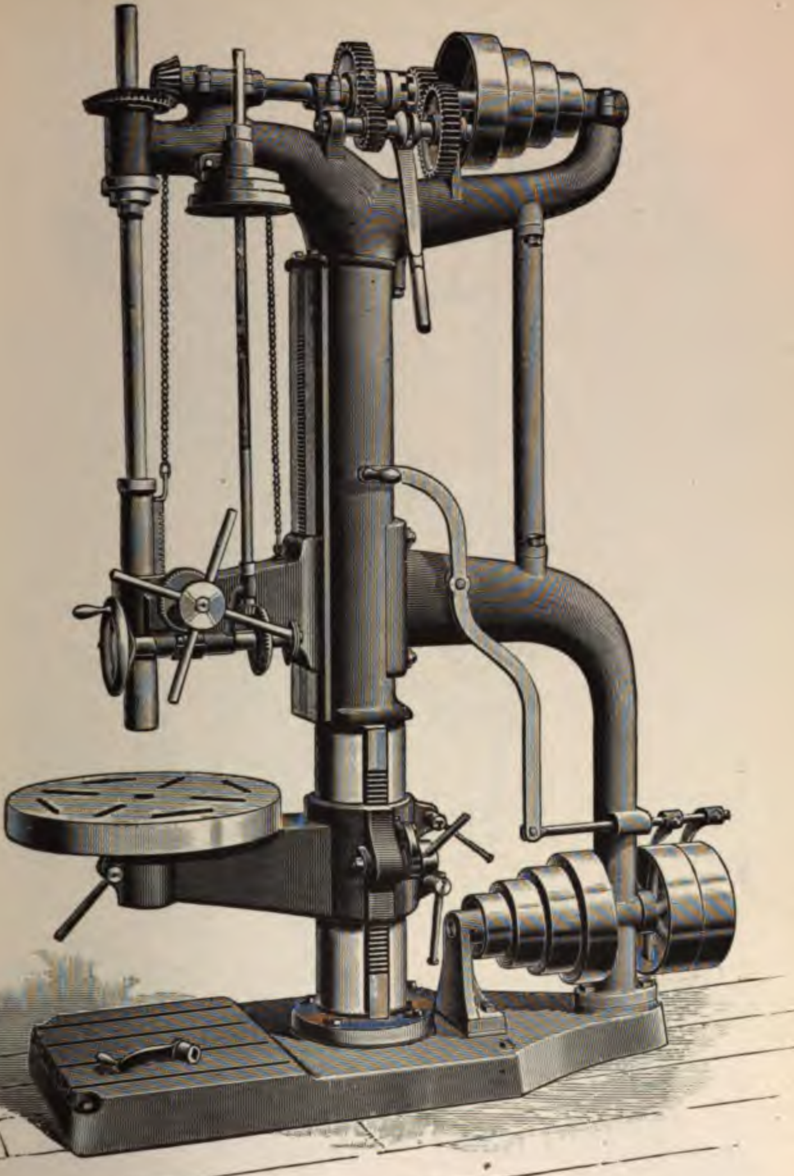
STANDARD 24-INCH UPRIGHT DRILL PRESS.

WITH PATENT AUTOMATIC STOP.

SPECIFICATIONS.

Code Word.	Swing.	Morse Taper. No.	Total Height	Base to Spindle.	Table to Spindle.	Traverse of Spindle	T & L Pulleys.			Weight	Price.
							Diam.	Face.	Rev.		
Foracchia	14*	2	4'2"	25"	18"	4½"	7"	2"	350	300	$ ....
Foraged...	21†	3	6'	40"	27"	8"	9"	2½"	300	700	$..........
Foraggia..	24‡	4	7'4"	48"	34"	9"	10"	3"	275	1500	$..........
Foraging..	28‡	4	8"	50"	36"	10"	12"	3"	160	2200	$.........
Foraginis	32‡	4	8"	50"	36"	10"	12"	3"	160	2400	$..........
Forago	40‡	5	9'4"	55"	41"	12"	12"	3"	175	3600	$..........

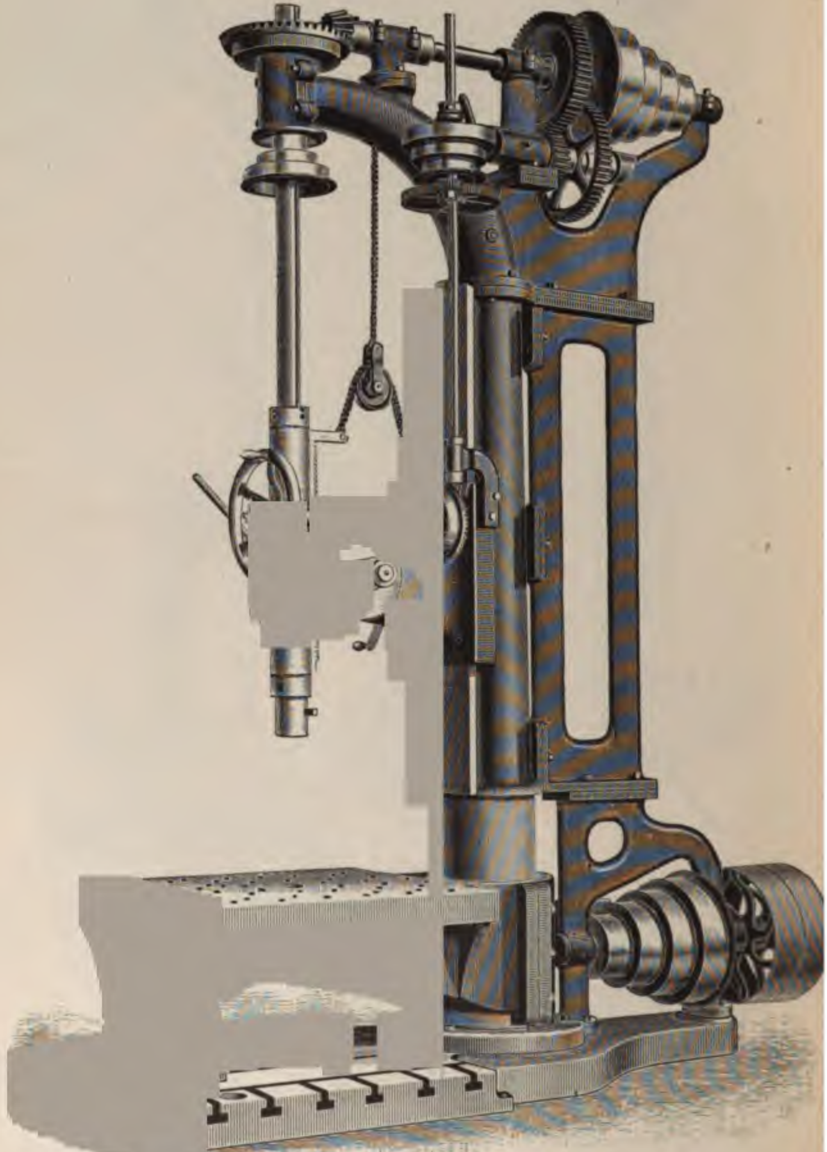
*Bench drill with sliding head: is mounted on column.
†Is back geared: has power feed, automatic stop and stationary head.
‡Is back geared: has power feed, automatic stop and sliding head.



STANDARD 32-INCH BACK-GEARED AND POWER-FEED UPRIGHT DRILL.

With Gibbed Sliding Head and Patent Automatic Stop.

Tabulated Information on Opposite Page.



HEAVY 50-INCH SWING UPRIGHT DRILLING MACHINE.

DESCRIPTION OF UPRIGHT DRILLING MACHINE.

50-INCH SIZE.

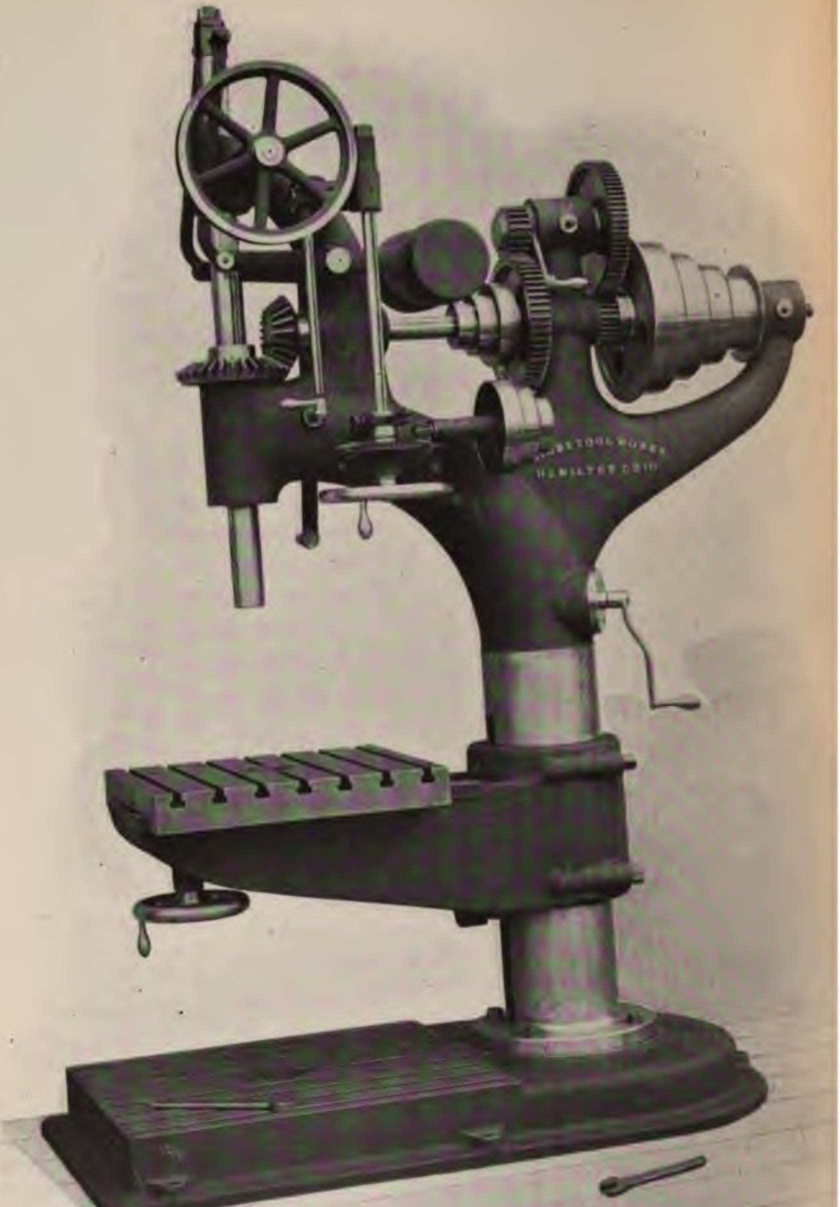
The cut on opposite page represents a 50-inch swing upright drill, intended for heavy bridge and locomotive work. The head and spindle are counterbalanced by one chain and weight, allowing either or both to be loosened without danger of falling. Each machine is provided with a quick return movement. The head is raised and lowered on the column by power and is easily adjusted to any position thereon. This machine is supplied with a patented device for operating the back gears. It consists of a lever descending parallel with the feed rod, one movement of which to the right or left will enable the spindle to be driven directly from the cone or through the back gears.

The table swings on the column and is provided with a taper pin to bring it central with the spindle. The pinion bevel gears which connect with either the spindle or feed rod, are made of steel; likewise all shafts, studs and clutches. The feed cones have three changes, carrying a 1½ inch belt; to make greater change in speed, the spur gear on feed cone can be removed, and larger or smaller gears put on to obtain any required speed of feed necessary.

SPECIFICATIONS.

Code Word.	Swing.	Greatest Distance Spindle to Base.	Greatest Distance Spindle to Table.	Traverse of Spindle.	Morse Taper.	Cone Belt.	Countershaft.			Weight.	Price.
							Diam. Pulleys.	Face.	Rev.		
Foralite...	50″	66″	45″	15″	5	4″	18″	5″	125	9500 lbs.	$............

Size of table, 40 inches by 32 inches. Total height 11 feet. Floor space 8 feet 9 inches by 3 feet 4 inches.



50-INCH VERTICAL DRILLING MACHINE.

NILES VERTICAL DRILLING MACHINES.

The heaviest and most powerful on the market.

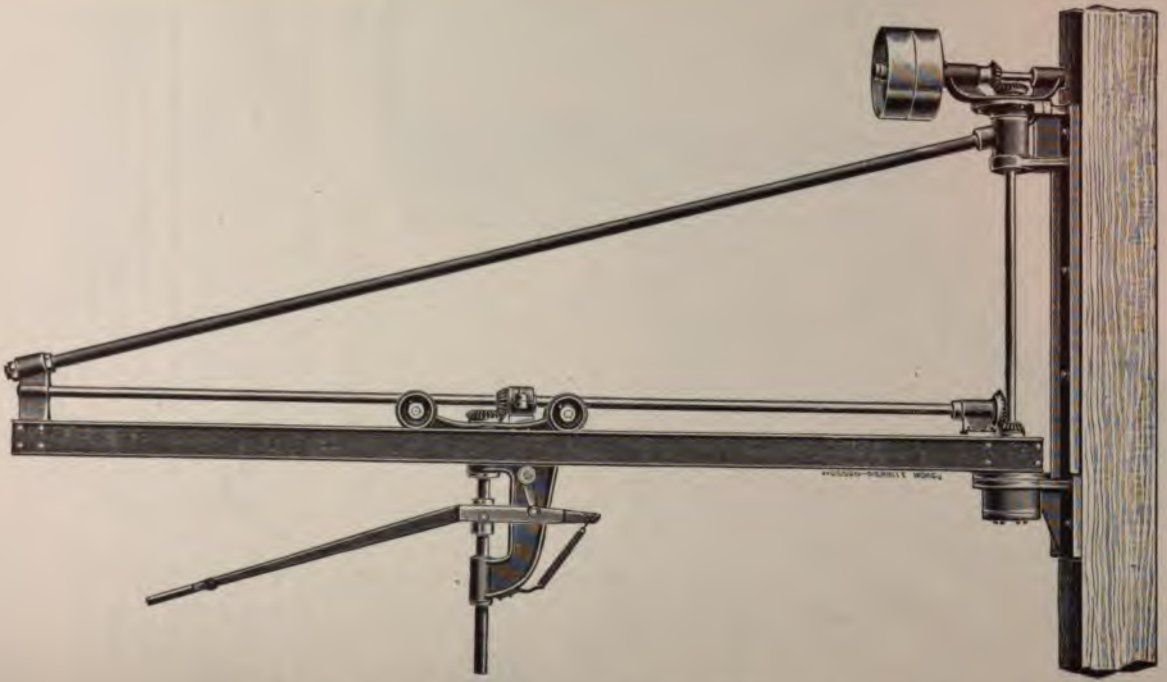
We illustrate on the opposite page our No. 5 machine, which drills to the center of a 50-inch circle. This machine is calculated to withstand the heaviest duty of modern practice, and is adapted for drilling holes from ½ inch to 4 inches and will bore up to 12 inches.

Machine is provided with a strongly gibbed, square table adjustable on its supporting bracket by means of a screw and bevel gearing. The utmost nicety of setting can thus be obtained and the movement may be used as a feed for profiling.

The table is raised and lowered by a screw in the column operated by bevel gearing, and may be swung around the column out of the way.

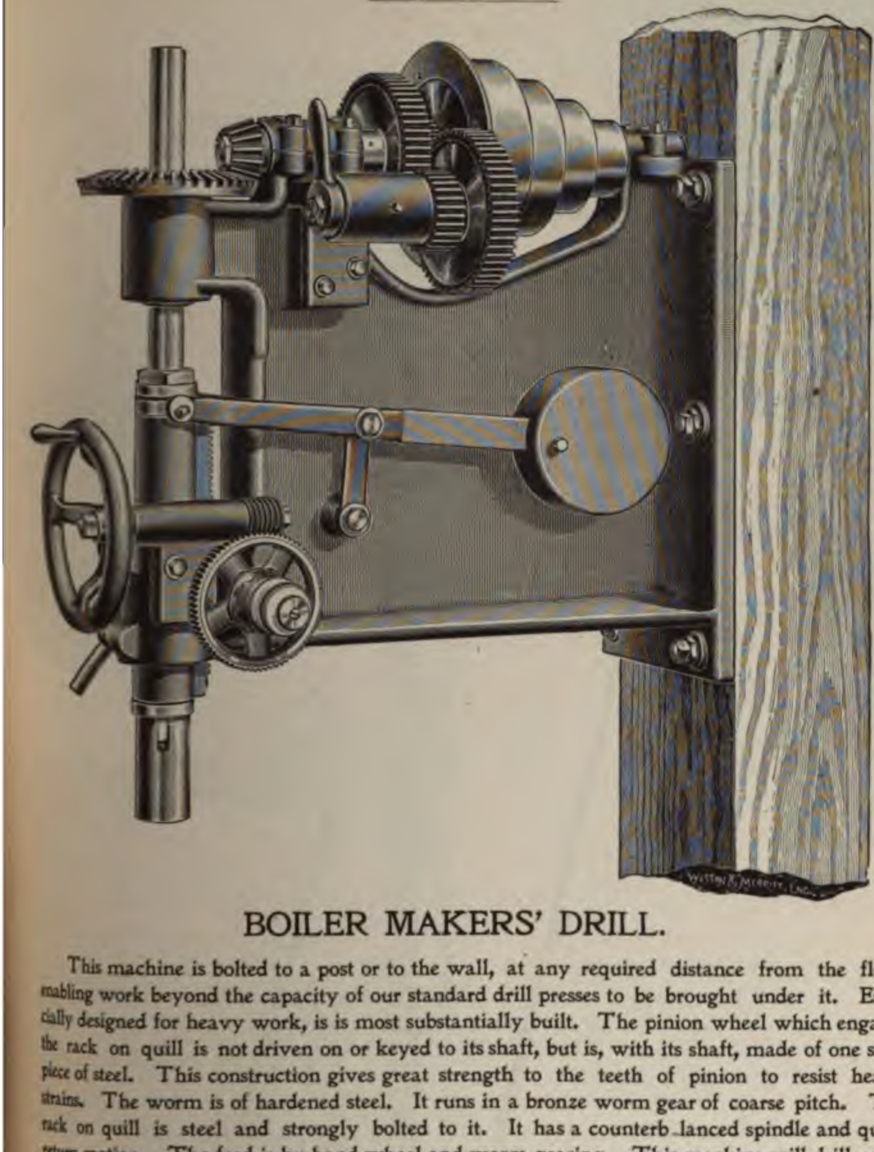
TABLE OF SIZES.

Code Word.	No.	Swing.	Greatest Distance From Spindle to Table.	Greatest Distance From Spindle to Base.	Travel of Spindle.	Steps on Cone.	Size of Belt.	Weight.	Price.
Nag	3	30″	35″	4′ 10″	12″	4	2½″	....	$........ ....
Naively...	4	40″	35″	4′ 4″	12″	4	2½″	....	$..............
Naked	5	50″	35″	4′ 8″	16″	4	3″	....	$. ....
Nakedly...	6	60″	36″	4′ 10″	18″	5	3″	....	$..............



RADIAL DRILLING AND COUNTERSINKING MACHINE.

For Description, see Opposite Page.



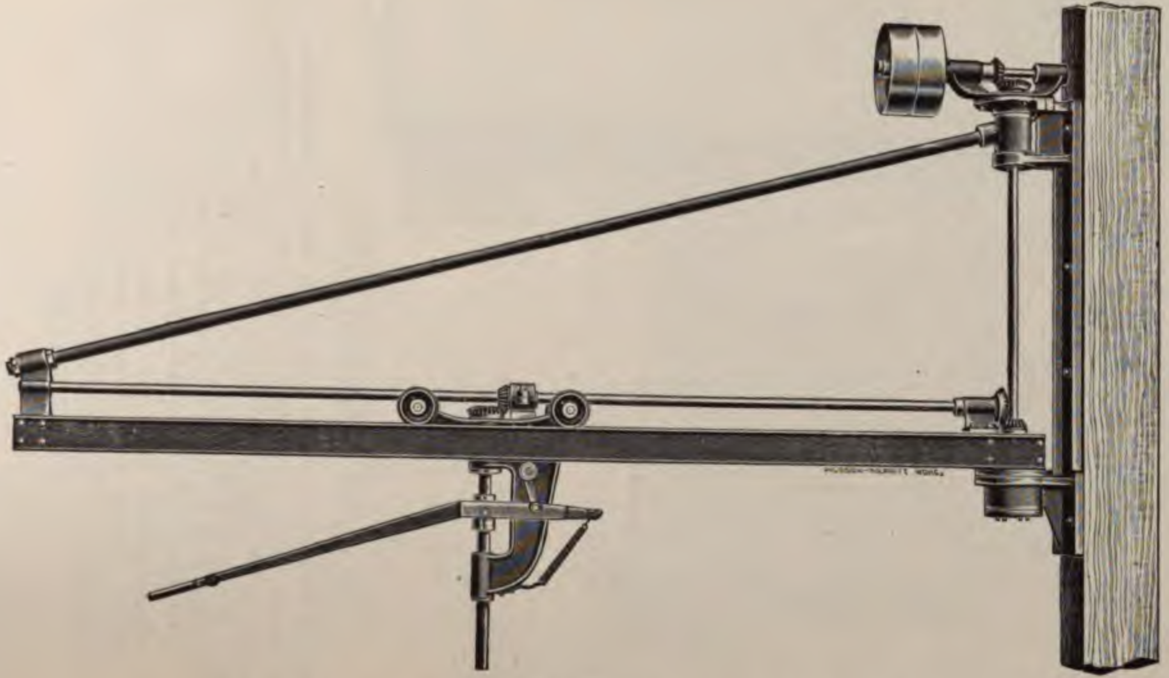
BOILER MAKERS' DRILL.

This machine is bolted to a post or to the wall, at any required distance from the floor, enabling work beyond the capacity of our standard drill presses to be brought under it. Especially designed for heavy work, is is most substantially built. The pinion wheel which engages the rack on quill is not driven on or keyed to its shaft, but is, with its shaft, made of one solid piece of steel. This construction gives great strength to the teeth of pinion to resist heavy strains. The worm is of hardened steel. It runs in a bronze worm gear of coarse pitch. The rack on quill is steel and strongly bolted to it. It has a counterbalanced spindle and quick return motion. The feed is by hand wheel and worm gearing. This machine will drill up to 2½ inch holes in wrought metal. We furnish countershaft with this machine.

SPECIFICATIONS.

Code Word.	Distance from Spindle to Post.	Vertical Traverse of Spindle.	Morse Taper.	Cone Belt.	Countershaft.			Weight.	Price.
					Diam. Pulleys.	Face.	Rev.		
Forandos.	36″	10″	No. 5	3¼″	14″	4″	200	1350 lbs	$............

Space occupied by machine, 43 inches high, 40 inches long, 20 inches wide.



RADIAL DRILLING AND COUNTERSINKING MACHINE.

For Description, see Opposite Page.

RADIAL DRILLING AND COUNTERSINKING MACHINE.

This machine is designed for use in boiler shops and ship yards, for drilling and countersinking large steel plates. These plates can be laid upon the floor, or bench underneath the machine. The radial arm is supported by one long, heavily ribbed wall plate, or bracket, for the purpose of bolting to a post or to the wall. It is placed at a sufficient distance from the floor for the operator to pass under. The radial arm swings easily upon ball bearings. The spindle is brought to any position, either by swinging the arm or by moving the head, carrying the spindle along the arm, both movements being easily accomplished.

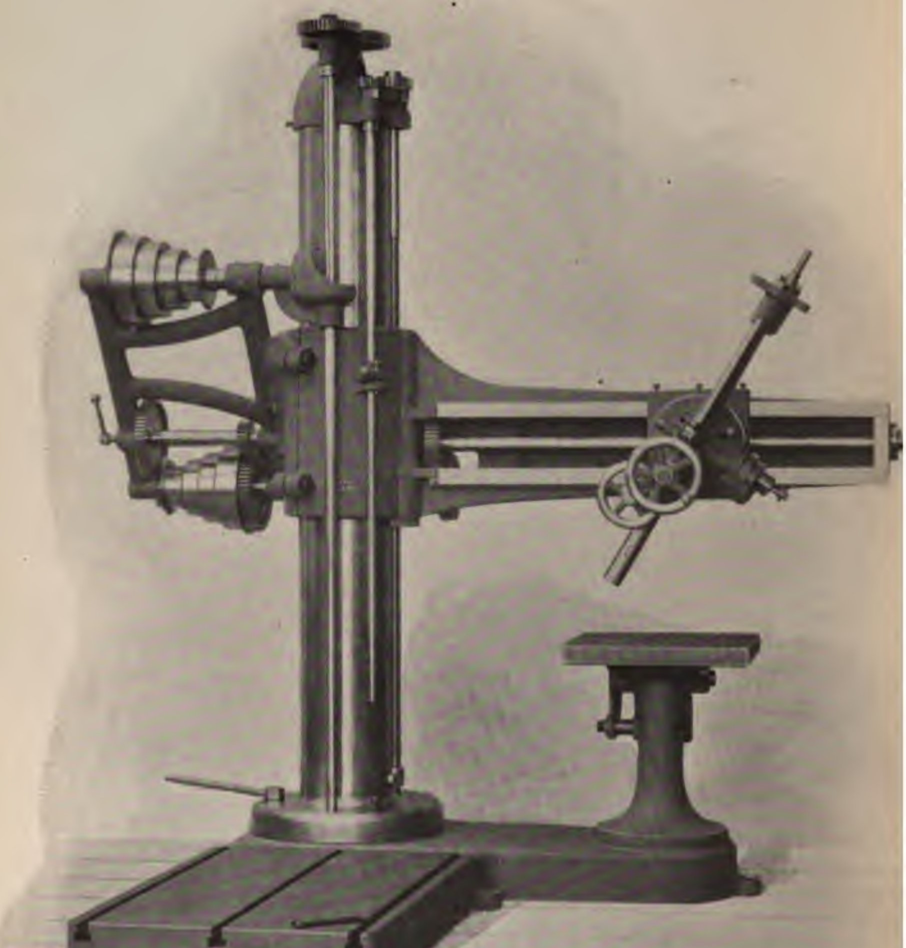
The spindle is fed by a long hand lever, and counterbalanced by a spiral spring.

The driving shaft is adjustable, for the purpose of belting from the main line, at either side of the post, or in the position shown in cut.

SPECIFICATIONS.

Code Word.	Length of Machine.	Maximum Distance Post to Spindle.	Minimum Distance Post to Spindle.	Vertical Traverse of Spindle.	Traverse Head on Radial Arm.	Countershaft Pulleys.			Weight.	Price.
						Diam.	Face.	Rev.		
Foraria....	15' 6"	14"	3"	7"	11"	16"	4¾"	120	2550	$..... ....

Maximun distance from under side of Radial arm to end of spindle, 40"
Minimun distance from under side of Radial arm to end of spindle, 33"
Size of wall plate, 82"x14"



No. 1½ RADIAL DRILLING MACHINE.

NILES RADIAL DRILLING MACHINES.

These drills are so constructed that the floor is left entirely clear and the arm may swing to any point.

There are no belts or driving gears to interfere with placing the work.

The column is bored out inside and fitted over a large post, which is firmly bolted to the sole-plate. The weight of the column rests on anti-friction bearing so that when the column base bolts are tight, the column is held securely but when the bolts are loosened the column will turn very freely.

The arm is very stiff, is guided on the column by a long split sleeve, has clamp bolts for fixing it firmly in position and is raised and lowered by power.

The drill head is easily adjustable on the arm, swivels to any angle and is balanced when spindle is down so that no danger is incurred by loosening the swivel bolts. Hand and power feeds are provided.

The countershaft is provided with tight and loose pulleys, also with a third pulley for reversing when desired. A vertical splined shaft extends downward from counter to center of column and will suit any ordinary height of counter without alteration.

Drill heads can be supplied with counterweighted spindles, rack feeds and without swivels when desired.

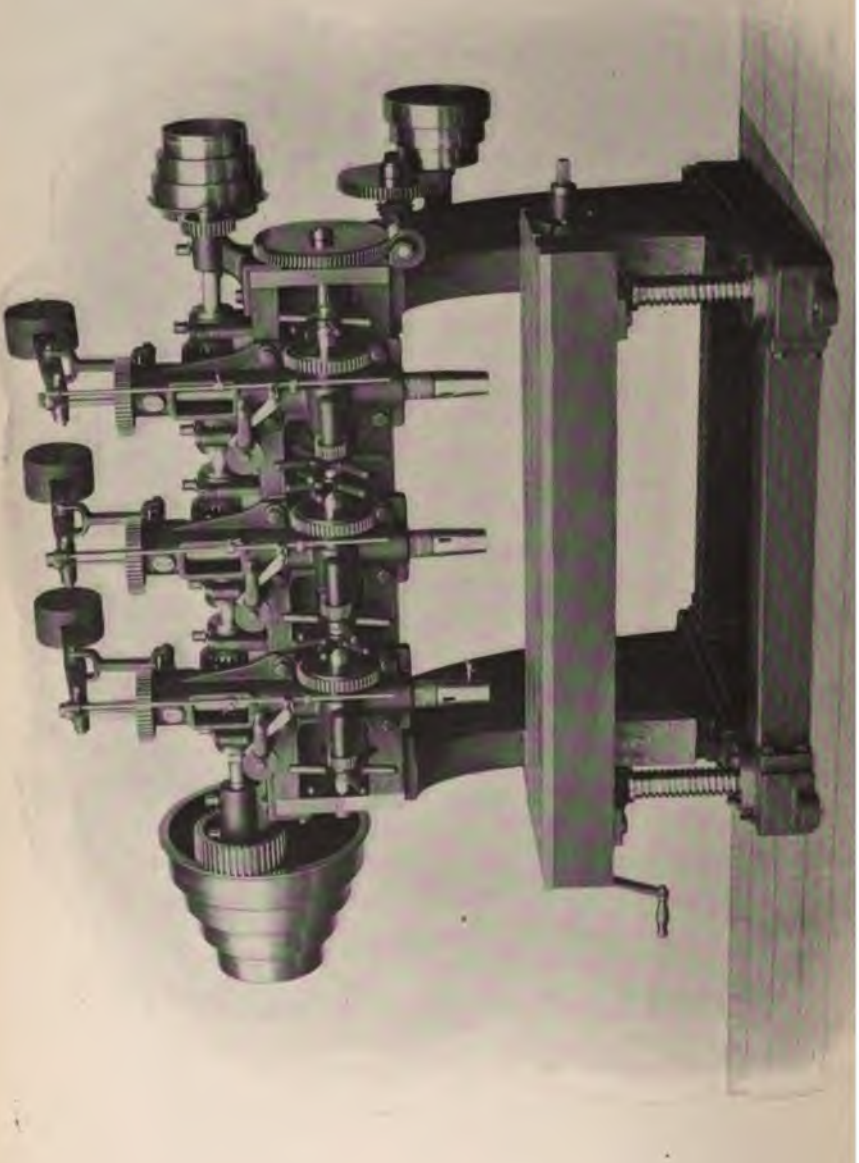
Rotating arms are also furnished with all our radials on special order and are generally kept in stock.

SPECIFICATIONS.

Code Word.	No	Length of Arm.	Height of Column.	Greatest Distance Spindle to Base.	Traverse of Spindle.	Steps on Cone.	Width one Belt.	Weight.	Price.
Nameless......	1	4′ 6″	6′ 8″	4′ 8″	12″	4	2″	....	$........
Namesake	* 1	4′ 6″	....	....	....	....	....	....	$........
Nape	1½	5′ 6″	7′ 4″	5′ 3″	12″	4	2¼″	....	$........
Napkin	† 1½	5′ 6″	....	....	....	....	....	....	$........
Naptha.........	2	6′ 10″	8′ 3″	5′ 7″	14″	4	2½″	....	$........
Narcotic.......	† 2	6′ 10″	....	....	....	....	....	....	$........
Narrative	3	7′	9′	6′ 5″	18″	4	2½″	....	$........
Narratio	4	8′	10′	7′	24″	4	4″	....	$........
Narrativos ...	5	7′ 6″	11′	7′ 6″	20″	....	....	....	$........

*Same Dimensions with Swivelling Head and Rotating Arm.

†Same Dimensions with Swivelling Head and Rotating Arm.



MULTIPLE DRILLING AND TAPPING MACHINE.

Designed for drilling and tapping such work as cylinders and heads, valve-chests, steam and water-valves, governors, couplings, flanges and work of like character.

Driving cone has four steps for a belt 4 inches wide. Machine is strongly driven and geared, the driving power being sufficient to carry three 1½ inch pipe taps at one time.

The three large drill heads are fixed on a heavy cross rail and placed 18 inches apart. Each spindle is independent in its action and has independent reversing gear and power feed.

The hand crank shown in front of each spindle at the top of rail operates a clutch between box bevels on the driving shaft. To this handle is attached a balance weight leading away from the machine. Tappets on the vertical rod in front of each spindle are adjustable to disengage a pawl from the hand reversing lever when the taps or drills have reached the required depth. The balance weight is thus permitted to act; it immediately disconnects the clutch from the driving gear and the spindle stops.

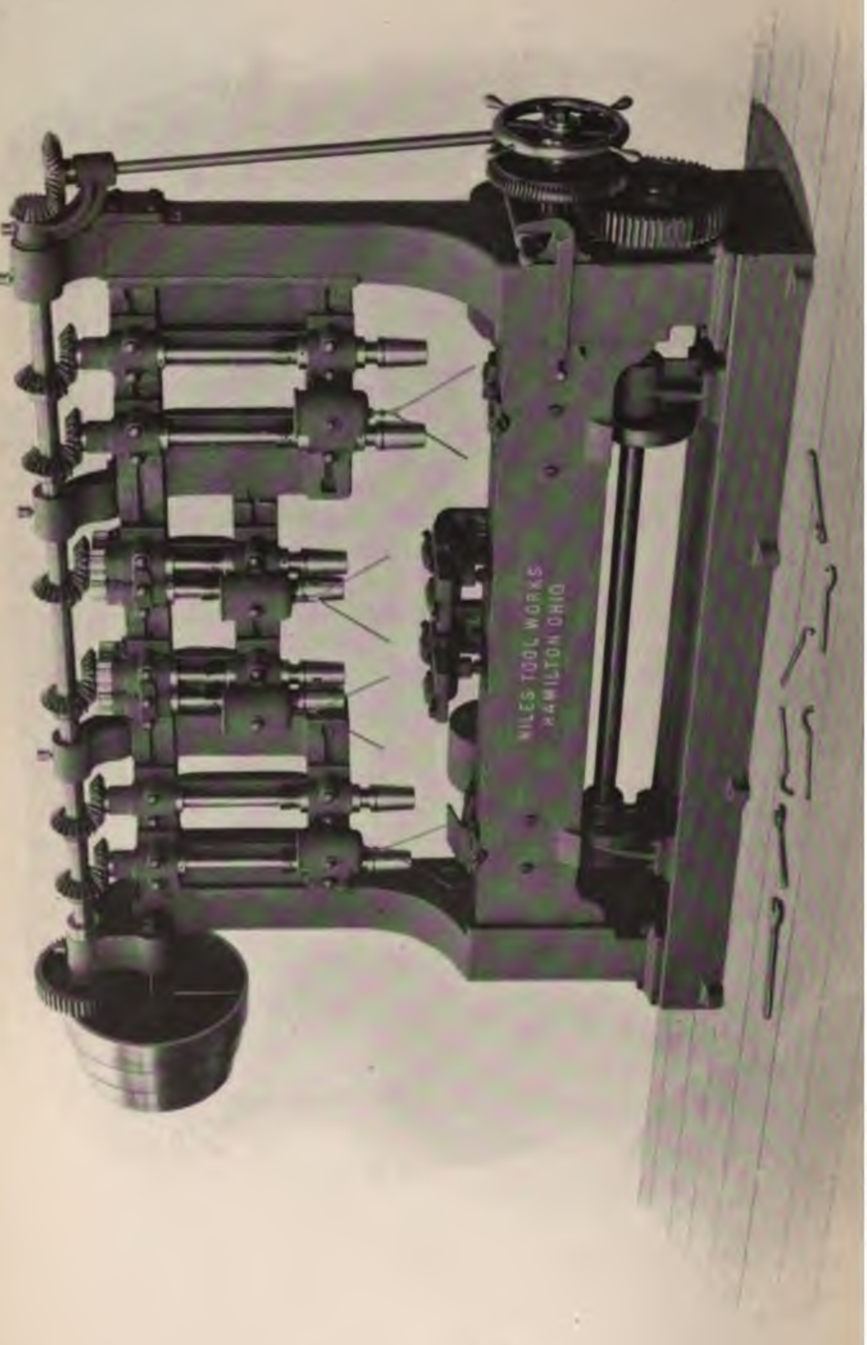
In drilling,, there is quick return by means of the pilot wheel and gears shown: in tapping, the hand crank is simply reversed and the spindle backs the tap out itself.

The table is supported on two heavy screws connected by bevel gears, and also firmly gibbed to the housings. It can be raised or lowered from either end and has a vertical range of 18 inches.

Power feed, with three changes, provided.

Countershaft pulleys 20 inches diameter for 4-inch belt. Slow speed, 220; fast speed, 300 revolutions per minute.

Code Word, Native. Weight.......................... Price, $..........................


NILES TOOL WORKS
HAMILTON OHIO

ARCH-BAR DRILLING MACHINES.

SIX AND EIGHT SPINDLES.

Designed for drilling car-truck frames.

Driven by cone with three steps for a belt 4 inches wide, and very strongly geared. The spindles are all operated by one heavy shaft, and drill the six or eight holes at one operation.

Each spindle has a socket adjustable vertically, allowing the drills to be used at different levels. Spindles have a lateral adjustment for change of centers. On 6-spindle drill center spindles have an adjustment from 6¾ inches to 22 inches between centers; on 8-spindle drill, 3½ to 7 inches; and the outside spindles of both have an adjustment from 7½ inches to 18 inches between centers.

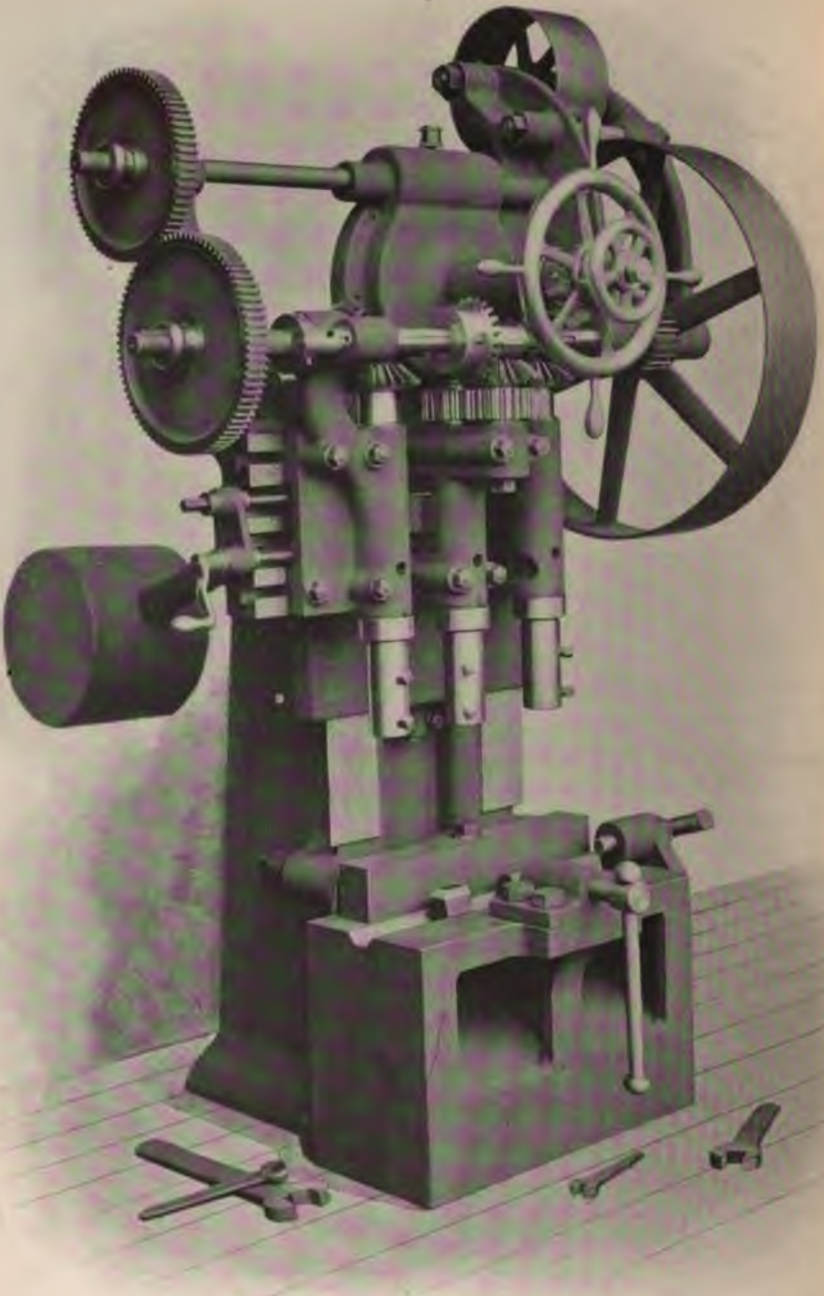
Feed is operated by cam at each end of the table.

Table may be raised or lowered by hand; is counterweighted, relieving the feed from the dead weight of the table and work; and furnished with supports for the arch-bar and necessary clamping devices.

These machines are unquestionably the strongest and most powerful built for this work. The service required is very heavy, and usually the machines are crowded to their utmost capacity.

Countershafts have two pulleys, 24 inches diameter, 4¾ inches face. Speed, 210 revolutions per minute.

6-Spindle Drill—Code Word, Narration. Weight.......................... Price, $........................
8-Spindle Drill—Code Word, Narwhal. Weight.......................... Price, $........................



3-SPINDLE RAIL DRILLING MACHINE.

RAIL DRILLING MACHINES.

TWO, THREE OR FOUR SPINDLES.

Designed for drilling steel rails for the fish-plate bolts.

The 3-spindle machine has capacity to drill three 1¼-inch holes in steel rails.

Range of drills is from 4 inches to 9 inches between centers. By means of adjusting-screws drill-head can be rapidly set to any required position. Drills are set in heavy sockets, and held by two strong set-screws. This enables all of the drill points to be set on a level. The feed on the three drills is simultaneous by acting on the saddle carrying the three drill-heads. Range of feed allows the use of drills from 10 inches in length under socket to about 4 inches.

Feed is transmitted to saddle by means of slip-gear on side of machine opposite to driving pulley. Two changes of feed can be obtained by simply transposing the slip-gears, thus giving a heavier feed when soft material is worked, and a lighter feed for hard material.

Driving pulley is attached to saddle, and idlers are provided to maintain the tension of belt in all its positions. The rail is supported on steel blocks, and clamped against the clamping block on its back. The end adjustment of the rail is obtained by a heavy set-screw in the cast-steel bracket on the side of bed.

The cuttings drop through the opening in the bed to the floor in front, and can readily be removed.

Our patterns are arranged so that the machine can be made either right or left, as may be desired.

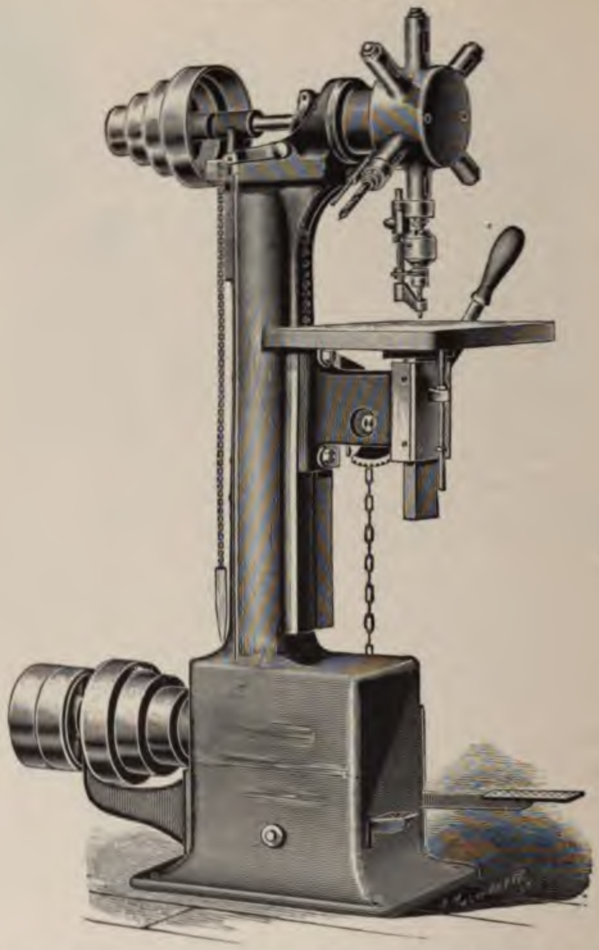
All of the driving gear are of steel, cut from the solid.

Countershaft pulleys, 3 and 4-spindle drill, 24 inches diameter, 6 inches face, for 5-inch belt. Speed, 90 revolutions per minute.

Countershaft pulleys, 2-spindle drill, 20 inches diameter, 4¼ inches face, for 3½-inch belt. Speed, 110 revolutions per minute.

We consider these machines the heaviest and strongest of their class on the market.

2-Spindle Drill—Code Word, Naturalist. Weight .... Price, $ ....
3-Spindle Drill—Code Word, Nature. Weight .... Price, $ ....
4-Spindle Drill—Code Word, Natureless. Weight .... Price, $ ....



SIX-SPINDLE TURRET DRILLING MACHINE.

GENERAL DIMENSIONS.

Longest distance from table to end of spindle	18¼ in.
Shortest distance from table to end of spindle	1 in.
Distance from center of drill to face of column	10 in.
Vertical movement of table	3½ in.
Speed of drills 250 to 2000 rev. with pat. cone countershaft running 350 revs.	
Drills from	0 to ½ in.
Diameter of Table	13¼ in.
Height from floor to center of turret	57 in.
Width of Base	14½ in.
Length	19 in.
Total weight, ready for shipment	430 lbs.
Code Word	Forab[illegible]t.
Price	$

SIX-SPINDLE TURRET DRILLING MACHINE.

Several drills, reamers, or counterbores may be fixed in their respective spindles, each with an independent drill-stop, which may be adjusted for various depths of holes, as shown in illustration, and all tools brought to same place in center of table, and drilling all holes to same alignment, with speed for drills varying from 250 to 2000 revolutions per minute, which may be changed instantly to speed desired by the operator, without moving from his position at the drill table. This machine is especially adapted for jig drilling, and all work where there are several holes from 0 to ½ in. of different sizes in same piece of work.

The advantages of the turret drill over the single spindle drill is that it saves the loss of time in stopping the drill and changing the tools. The advantage over the gang drill is, that it is cheaper, lighter, and easier to handle for the same class of work. The tools are up out of the way, and do not interfere with any size of work, or drill jig, as is the case where tools are placed in a row. This machine also drills all holes in center of table, which is much better than to drill on edge of overhanging table as is done with the gang drill.

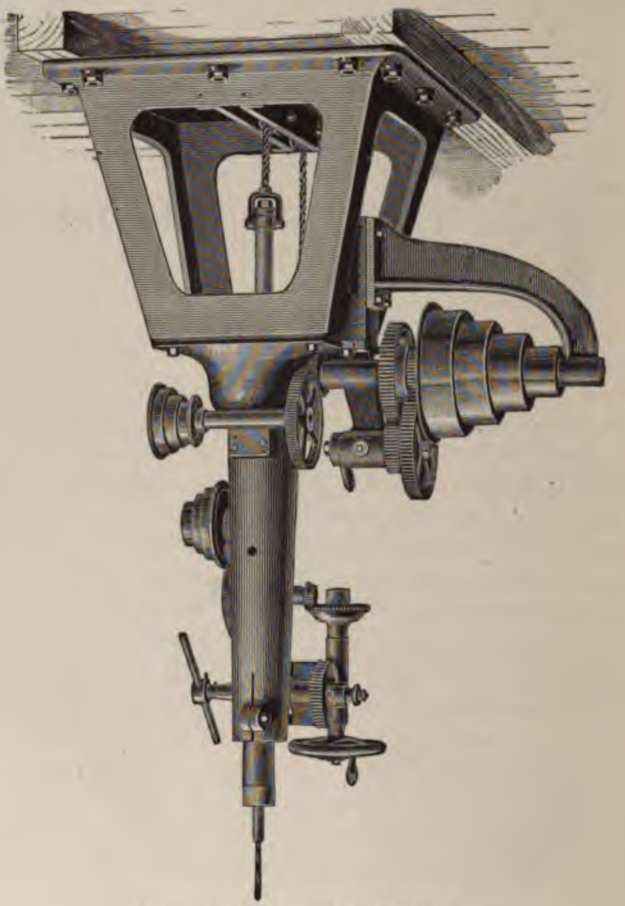
The machine is well adapted for what is called light or sensitive drilling, as the drill spindles may be adjusted to give as light a contact with driving discs as desired.

It is also well adapted for wood boring, for the reason that the spindles and tools are up out of the way, leaving the table clear for any length of work, and boring to the center of a 20-inch circle.

The drill is manufactured on the interchangeable principle, with specially designed tools.

This is the only turret machine on the market that revolves its cutting tool; all others of every description revolve or move the work.

A patent variable-speed countershaft is ordinarly supplied with this drill press, but an ordinary countershaft can be provided if preferred.



SUSPENSION DRILL.

The cut represents a Suspension Drilling Machine, made to fasten to the ceiling with coach screws or bolts. There is nothing in this machine to interfere with the swing of any work that may be brought under it. The frame is rigid, in one casting and needs no truss rods to support it. The spindle is counterbalanced, has hand and power feed, quick return movement and three changes of feed. Change gears can be furnished to give any required feed.

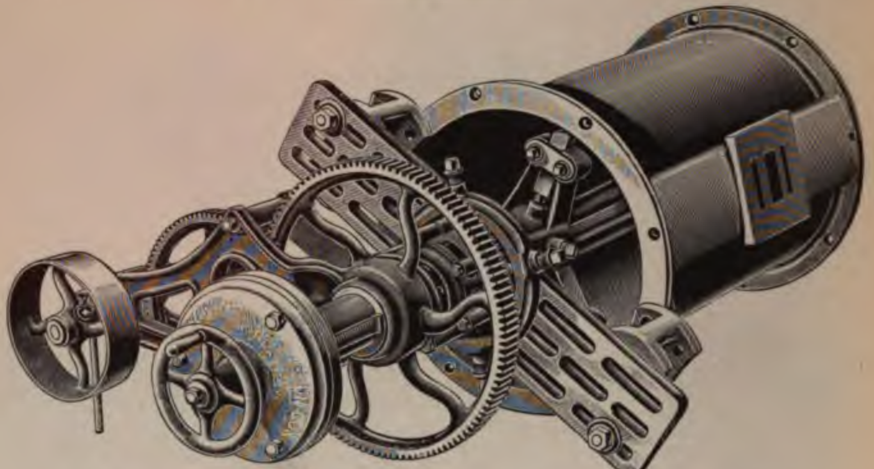
SPECIFICATIONS.

Code Word.	Will Drill	Morse Taper.	Vertical Traverse of Spindle.	Countershaft.			Weight.	Price.
				Diam. Pulleys.	Face.	Rev.		
Forasizo...	¼" to 2"	No. 4	19"	14"	4"	200	1600 lbs.	$...............

Distance from ceiling to lower end of spindle, when spindle is at its greatest height, 68 inches.
Ceiling space required to fasten frame 36 inches square.

PART X.

BORING MACHINES.



PORTABLE CYLINDER BORING MACHINE.

This machine is designed for re-boring all makes and sizes of steam-engine cylinders, pumps, steam hammers, blowing engines, air compressors, mining and hoisting engines, corliss valves, hydraulic and steam hoists, heavy housings, large wheels, etc. It will bore with one or both cylinder heads off, either vertical, horizontal or inclined on the engine bed, or laying on the ground. It is so constructed that the piece being bored serves as the bed or support of the bar. It is only necessary to take off the cylinder head and remove the piston, when the cylinder can rapidly and accurately be bored out. This saves breaking the steam joints, bolts, etc., and often cylinder can be re-bored in less time than it would take to remove cylinder from its bed.

The cutter-heads are fed by a screw in one side of bar, and are operated by the feed-casing on the end that contains the gearing, by changing position of which two changes can be made, slow feed for roughing out, and fast for finishing cuts. The feed is automatic and constant, and at the pleasure of the operator. The bar is driven by a train of powerful cut gears, either with a crank or belt for power. We furnish with this bar a self-centering chuck that fits in the stuffing-box, supporting the bar perfectly central at that end. We also furnish two cross-heads and bearings to support the bar when both cylinder heads are off. In many instances this tool is particularly valuable, requiring to be only the length of the cylinder, and the bearings for it. The bar and screw, are made of cast steel and are fitted for doing very rapid and exact work.

When ordering give length and diameter of cylinders and size of stuffing boxes, that the expanding chuck and cutter-heads may be furnished to suit.

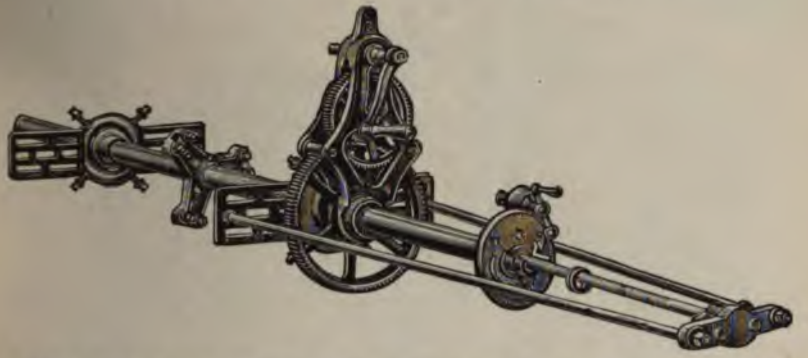
One set of tools, wrenches, and full directions are furnished with each machine.

The cut above shows bar in cylinder with only one head removed.

SPECIFICATIONS.

Code Word.	Diam. of Bar.	Bores Cylinders Diam	Stroke.	Price.
Forbotto..................	2½"	4" to 12"	30"	$..........
Forbreak..................	3"	6" to 16"	36"	$..........
Forbye..................	3¼"	8" to 22"	42"	$..........
Focacci..................	4"	10" to 24"	60"	$..........
Forcadel..................	4½"	12" to 30"	60"	$..........
Forcais..................	8"	2" to 60"	72" Bar 8' long	$..........
Forcant..................	8"	20" to 60"	120" Bar 17' long	$..........

PATENT IMPROVED PORTABLE LOCOMOTIVE CYLINDER BORING MACHINE



BAR AND SCREW OF CAST STEEL WITH TWO EXTRA CUTTER-HEADS
OPERATED BY HAND OR POWER

This machine is especially adapted to boring out locomotive cylinders in their places, by removing only one or both heads and piston. The back-head, cross-head or slides need not be removed, unless so desired. On removing the piston and leaving the front-head and stuffing-box, a small cone takes the place of the stuffing box at once, and, with proper adjustment at the front-head, the machine is ready for work; it is fed with a constant feed by cut-gears. The clamps or cross-heads are so arranged that they may be used conveniently on locomotive cylinders of all sizes. The same bolts or studs that fasten the cylinder-head on are used to bolt the bar supports also. Two rods are fastened to the ends of the cross-head that supports the bar in cylinder and to an adjustable swivel cross-head on end of screw; these take the whole of the thrust and torsion strain of the bar. It makes no difference which position the bar is in, the end thrust is always in exact line with it, causing itto cut steadily, smoothly, and absolutely true.

The larger sizes of this machine are made with convenient change of feed, so that after the roughing or truing cut has been taken, it can be instantly changed to a coarse feed, finishing quickly and accurately.

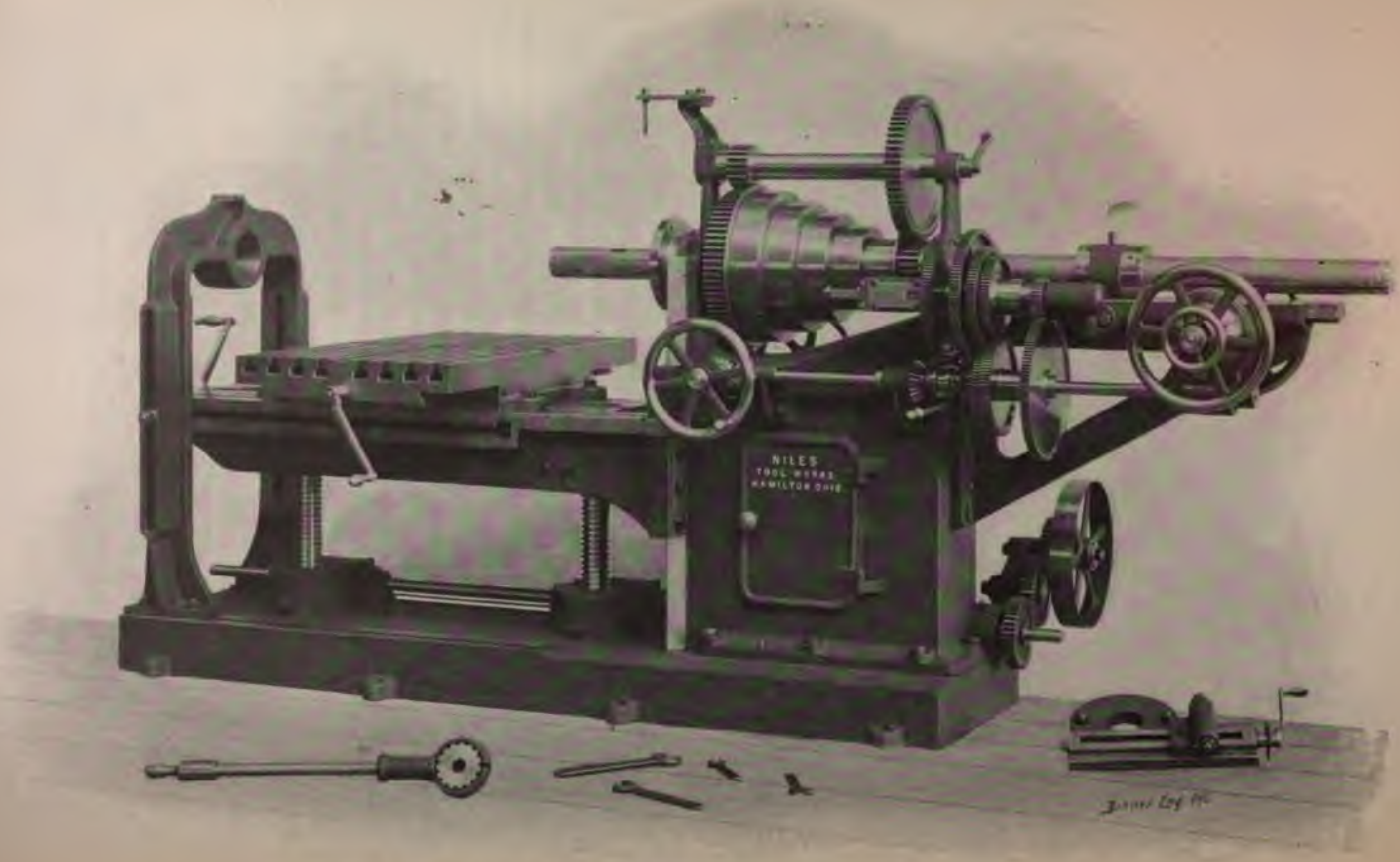
These bars are accurately ground, bearings are scraped out to fit, and they will stand a great amount of wear before loss of motion occurs.

Cutter-heads are furnished for boring driving boxes.

A crank or pulley is furnished with each machine.

They are built in three sizes, with the capacities shown:

Code Word.						Price.
Forbicina,	Bar 2½ in.	diameter;	bores from	8 in.	to 16 in.	$..........
Forbidden,	" 3	"	"	10	" 20 "	$..........
Forbimmo,	" 3¼	"	"	10	" 24 "	$..........



No. 2½ HORIZONTAL BORING AND DRILLING MACHINE.

HORIZONTAL BORING AND DRILLING MACHINES.

This is one of the most convenient and serviceable types of machine tools ever built.

The facilities for clamping work to the table and bringing it into position for drilling, boring or milling are almost equal to those of the universal milling machine, but for much larger work.

The spindles are made of high carbon, hammered steel, ranging in diameter from 2½ to 5 inches, according to size of machine. The traverse of spindles is from 17 inches to 72 inches; reversible power feeds and hand quick return are provided.

The tables have power and hand elevating gears; except the smallest machine, which has hand elevating only.

The cross tables have cross and longitudinal movements by screws. Circular tables with revolving feed or hand motions can be provided, also screw-cutting attachments, power cross and longitudinal feeds, when ordered.

Countershaft pulleys, No. 1 machine, 16 inches diameter, 3½-inch face for 3-inch belt. Speed, 96 revolutions per minute.

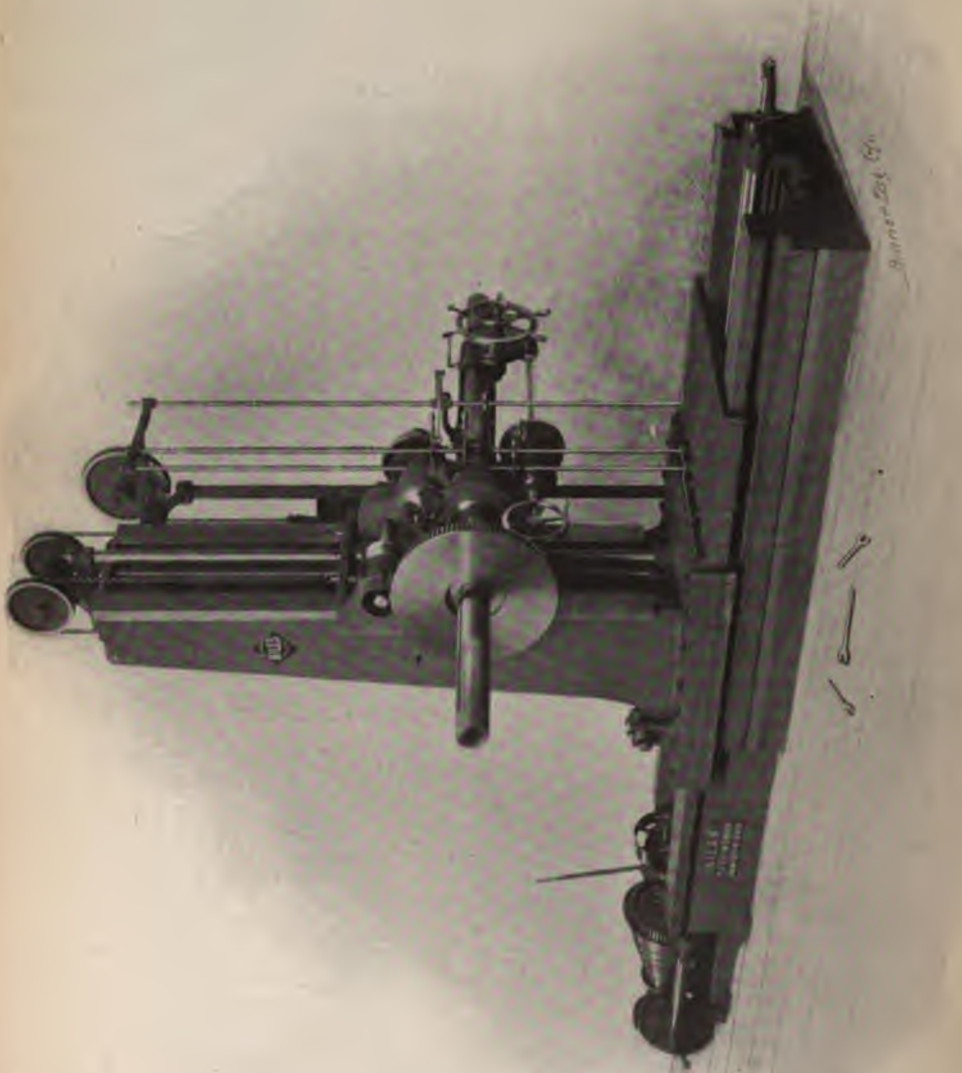
Countershaft pulleys, Nos. 2½ and 3 machine, 22 inches diameter, 5-inch face for 3½-inch belt. Speed, 75 revolutions per minute.

Countershaft pulleys, No. 4 machine, reversible, 24 inches diameter, for 4½-inch belt. Speed, 100 revolutions per minute.

SPECIFICATIONS.

Code Word Standard Machine.	No.	Swing.	Length of Lower Table.	Traverse of Spindle.	Weight.	Price Standard Machine.	Price Power Cross-feed.	Price Circular Table.	Price Circular Table Operated by Worm Wheel.	Price Chasing Attachment.
Mutilate......	1	48"	4' 3"	17"	....	$..............	$..............	$..............	$..............	$..............
Mutilation.	2½	60"	6'	54"	....	$..............	$..............	$..............	$..............	$..............
Muting......	3	66"	8'	60"	....	$..............	$..............	$..............	$..............	$..............
Mutton......	4	72"	9'	72"	....	$..............	$..............	$..............	$..............	$..............

In addition to code word for standard machine, add word "Mutual" for "machine with power cross-feed."
In addition to code word for standard machine, add word "Mutuary" for "machine with circular table."
In addition to code word for standard machine, add word "Mutuato" for "machine with circular table operated by worm-wheel."
In addition to code word for standard machine, add word "Mutulos" for "machine with chasing attachment."
Example "Mutilation Mutulos." "No. 2½ machine with chasing attachment."



Binner Eng. Co.

HORIZONTAL BORING, DRILLING AND MILLING MACHINES.

These machines are designed for all classes of boring and drilling, and in addition have ample power and the necessary feeds for milling. For the latter service the machines are especially valuable, doing work that otherwise would require a large planing machine.

The machines consist of heavy columns mounted on bed-plates of any length to suit requirements. The columns are moved along the bed-plate by power, operating through worm-gear and rack.

The saddles have vertical traverse on columns from 3 feet upwards, are raised and lowered by heavy screws and are balanced by counterweights hung on backs of columns.

Boring and milling spindles are hammered steel, slide in heavy revolving sleeves and have traverse as ordered. They revolve in either direction, right or left hand, reversing by lever conveniently located and are provided with hand feed and quick return.

The milling feeds are applied to the column and saddle by power and any of these feeds may be utilized to set a drill, boring-bar or milling cutter to work anywhere on the surface which the machine will reach.

At one end of the bed-plate is placed the driving gear, milling feed and quick traversing mechanism for the column.

Countershaft pulleys, Nos. 5, 9, 10 and 11 machines, 24 inches diameter, 5½ inches face, for 5-inch belt; Speed, 165 revolutions per minute.

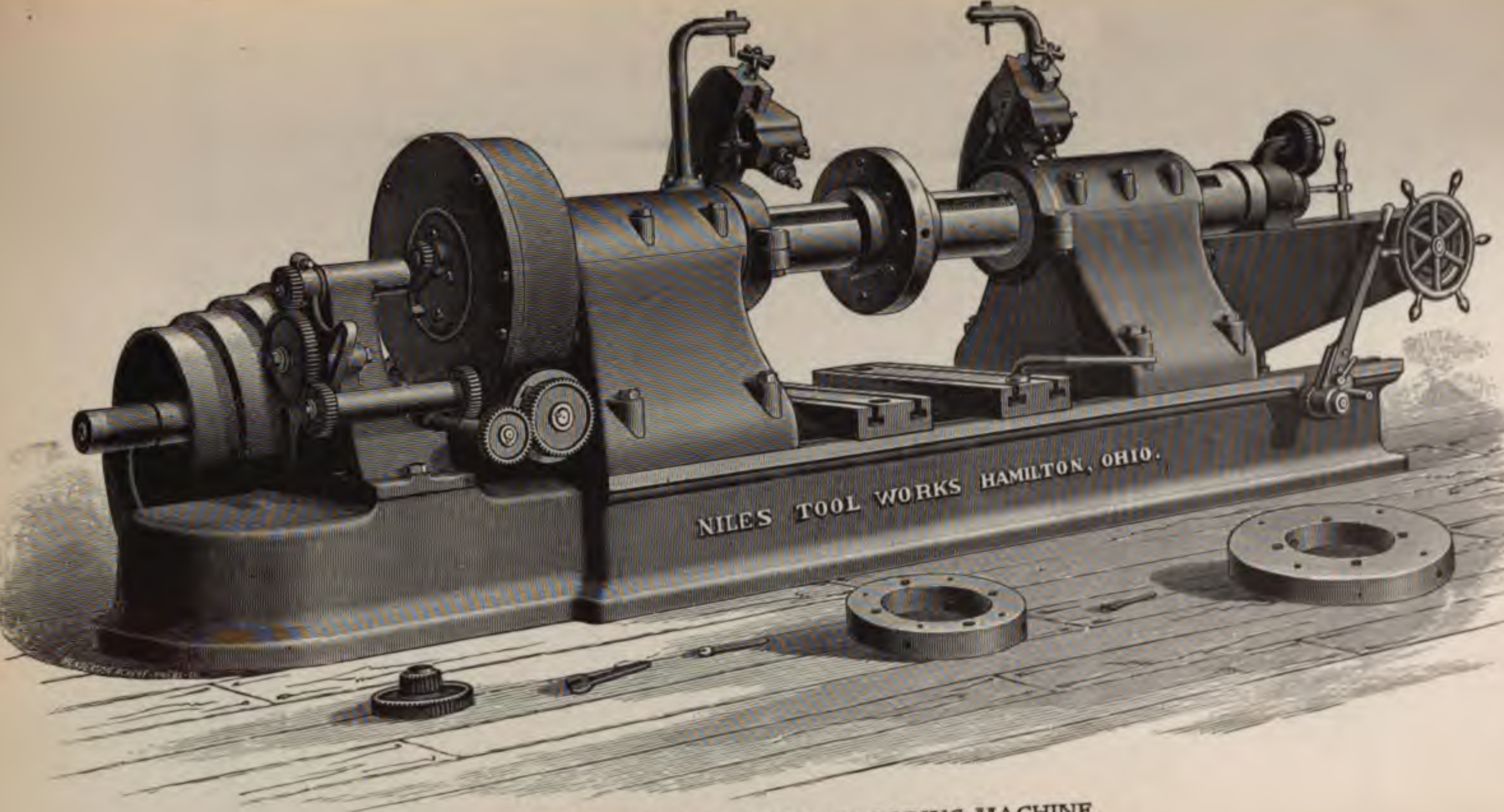
Countershaft pulleys, No. 8 machine, 20-inch diameter, 5¾ inches face, for 5-inch belt. Speed, 150 revolutions per minute.

Machines built with or without floor plates as desired.

SPECIFICATIONS.

Code Word Without Floor Table.	Name of Machine.	Horizontal Traverse	Vertical Traverse.	Spindle Traverse.	Without Floor Table.	
					Weight.	Price.
Myriad.........	No. 5	9′	6′	48″	....	$............
Myrtle..........	No. 5	12′	8′	48″	....	$............
Mysceli.........	No. 8	8′	4′	30″	....	$............
Myscellus.....	No. 9	10′	5′	48″	....	$............
Myscole........	No. 10	10′	6′	60″	....	$............
Myself..........	No. 11	10′	8′	60″	....	$............

Countershafts and wrenches are furnished.


NILES TOOL WORKS HAMILTON, OHIO.

No. 2 LOCOMOTIVE CYLINDER BORING MACHINE.

CYLINDER BORING MACHINES.

Machines can be supplied for all types of steam engine and pump cylinders, from the smallest to the largest sizes.

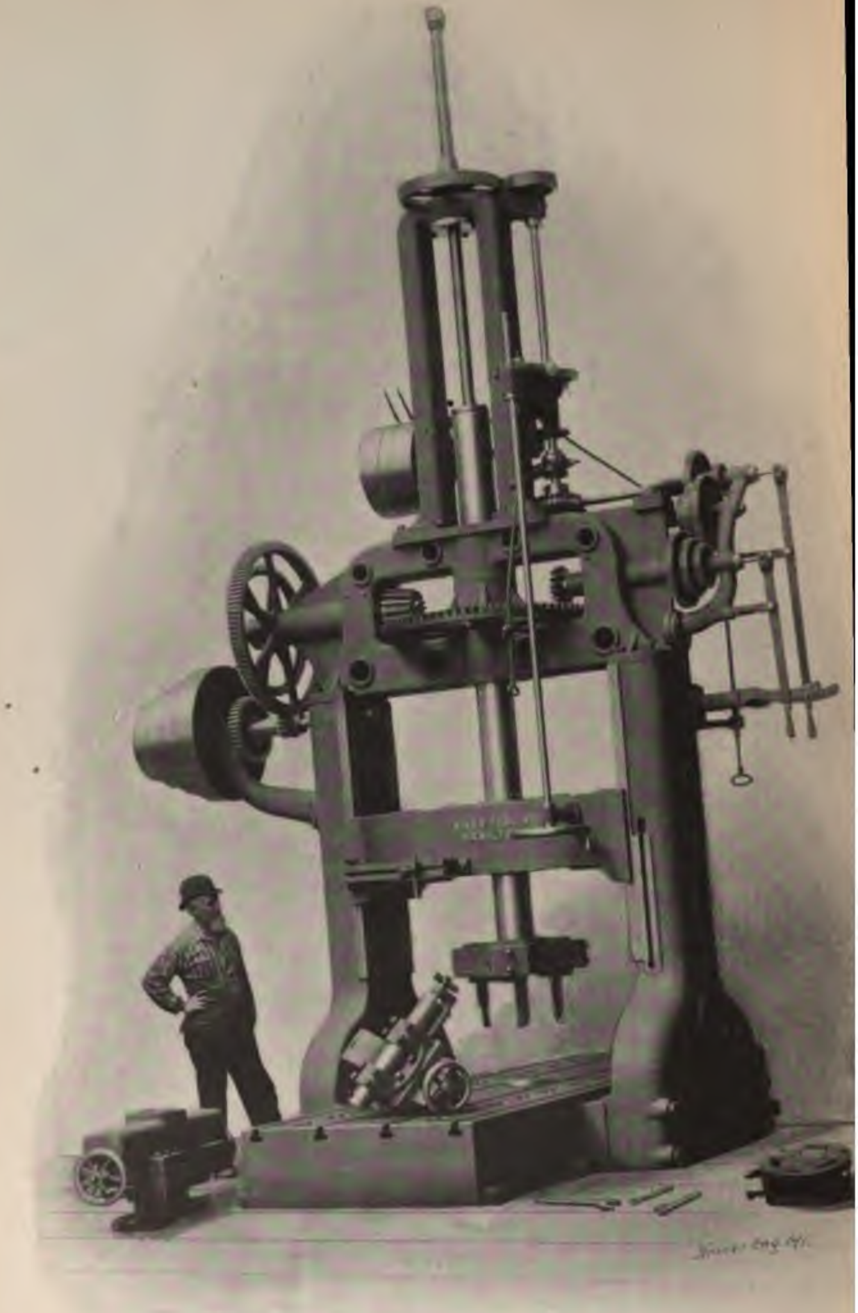
The Locomotive Cylinder Boring Machine can be made to handle any size or length of cylinder desired. The boring is done by traveling heads on a bar which is firmly supported and which has quick traverse by hand for withdrawal from cylinder. One head is adjustable to suit length of cylinder, and both headstocks are supplied with facing heads which will both face and turn the outside of flanges.

For other types of engines, machines are built in various styles to suit the work to be done.

For corliss cylinders, port boring attachments are built with one or two bars mounted on adjustable columns, which can be set to any port; in which case the machine will bore and face the cylinders and bore the ports at the same time.

SPECIFICATIONS.

Code Word.	Name.	Largest Cylinder will Bore.			Countershaft Pulleys.			Weight.	Price.
		Type.	Length.	Diam.	Diam.	Face.	Revs.		
Musket........	No. 1	Cylinders.	30"	22"	28"	4½"	125	....	$..................
Muskmelon.......	No. 2	"	39"	28"	30"	6"	100	....	$. ....
Muslin..............	No. 3	"	60"	36"	20 & 30"	6"	100 & 150	....	$........ ....
Mustachial........	No. 4½	"	60"	42"	30 & 36"	6½"	100 & 150	....	$................
Mustang............	No. 5	Corliss Cylinders.	10'	42"	26 & 34"	6"	138 & 166	....	$....... ....
Mutely.........	No. 6	" "	10'	60"	24"	5½"	130	....	$......... ....



No. 2 CRANK BORING MACHINE.

CRANK BORING MACHINES.

These machines are specially designed for boring heavy forgings, coring out holes from the solid.

The cross-rails are adjustable vertically so as to bring them close to the work.

The feeds are operated entirely by gearing, no belts are used. There are six changes of feed, which may be quickly made by internal clutch without changing wheels.

The boring spindles have quick return, operated by power from independent countershaft; the same power raises and lowers the cross-rails.

The boring spindles have three large and long bearings, all fitted with bushings.

All necessary provision for taking up wear is made in the feed nuts of the spindles.

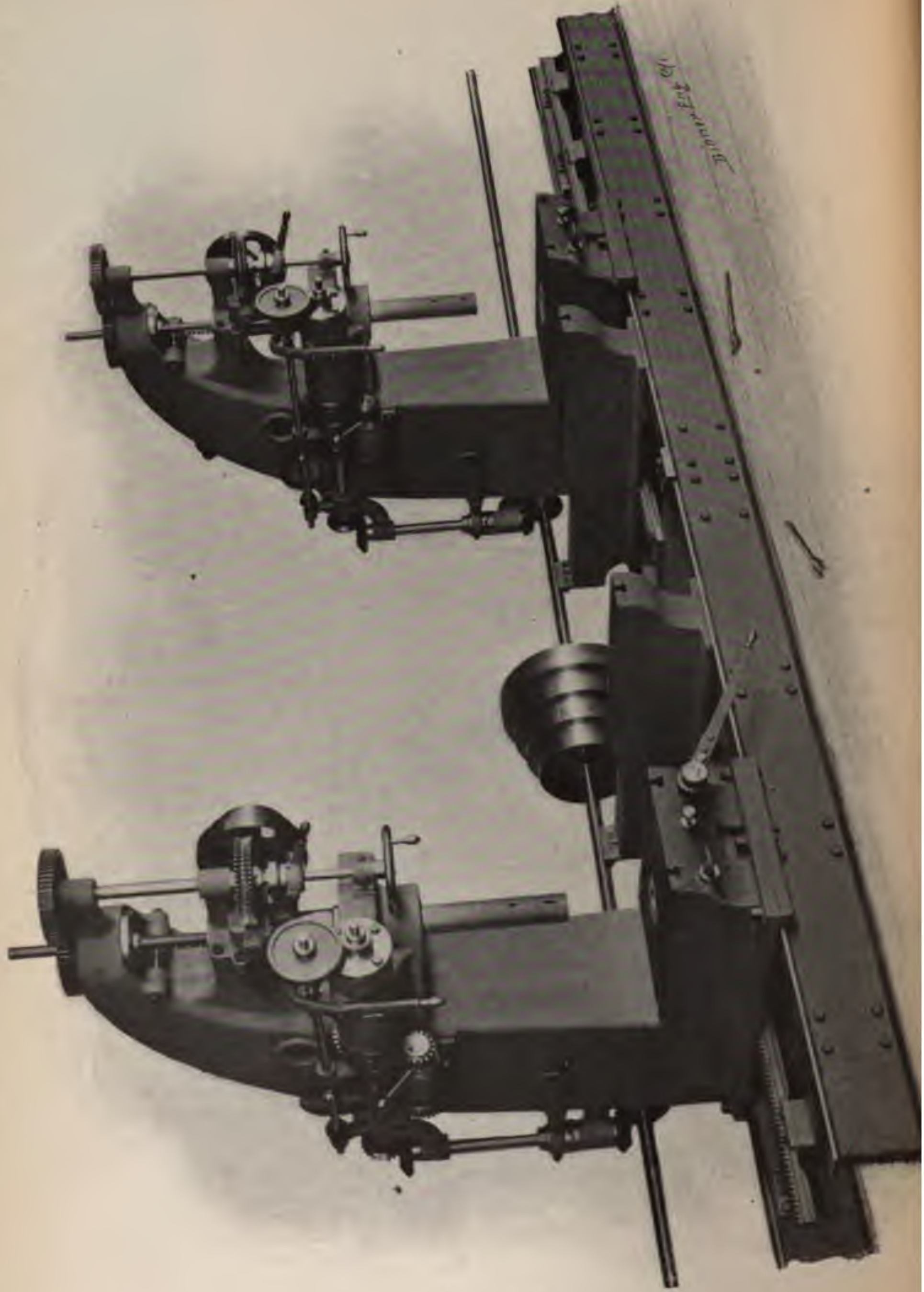
Two sets of gearings are provided to give a range for boring holes from 2 inches to 22 inches diameter. The gearing is all very strong and heavy, and all cut from the solid.

For the operation of taking out the core of large size cranks this machine is peculiarly well adapted.

Heads for facing are provided. When in use these heads are fitted to the spindles, and carry two tool heads, provided with power feed. Will face off work up to 44 inches diameter.

SPECIFICATIONS.

Code Word.	Name.	Distance Between Housing.	Height Under Tools.	Traverse Boring Bar.	Countershaft Pulleys.			Weight.	Price.
					Diam.	Face.	Revs.		
Mythology....	No. 2	60″	60″	60″	24″	6″	200	....	£...............
Mythoplasm..	No. 4	63″	6 ″	60″	24″	6″	200	....	£...............



Binner Eng Co

CHORD BORING MACHINE.

FOR BORING BRIDGE CHORDS AND I BEAMS.

Very powerful and heavy machine. It is arranged with two independent heads on one bed, adjustable on the bed for varying lengths. The bed may be made of any length to suit.

The two heads are complete in themselves, driven independently, and with all attachments, feeds, etc., for a complete boring machine. They are of great strength and power. The power is ample for boring four holes, punched 4 inches diameter to 8 inches diameter at one time, and the range of speeds is such as to adapt the machine for drilling down to 1½-inch holes.

The heads bore to the center of 36 inches, and take in under the cutter work 36 inches high.

Spindle has 24 inches traverse.

Range of work, in length 5 feet to 50 feet between centers.

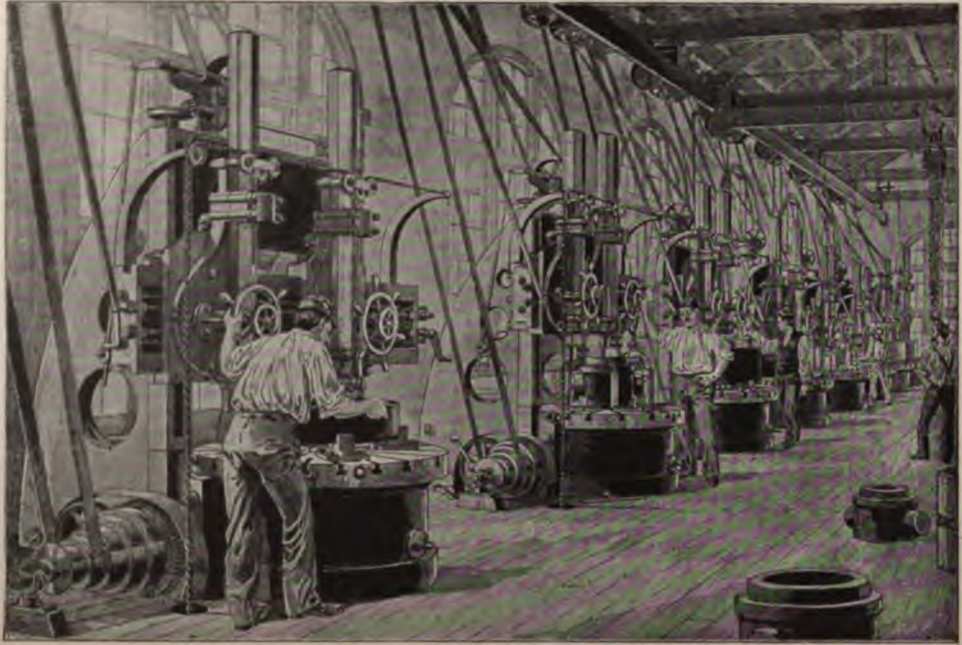
Feeds are by power, and are reversible up or down, and range from $\frac{1}{40}$ inch to $\frac{1}{64}$-inch for heavy work, and coarser feeds for light work.

The bed is formed of wrought iron I Beams.

Two independent carriages for supporting work on the bed are provided.

The counter-shaft has three pulleys, 26 inches diameter. Outside pulleys, 11 inches face, center pulley, 6½ inches face. Speed, 200 revolutions. 6-inch belt for driving spindles, 4-inch crossed belt for traversing columns on bed.

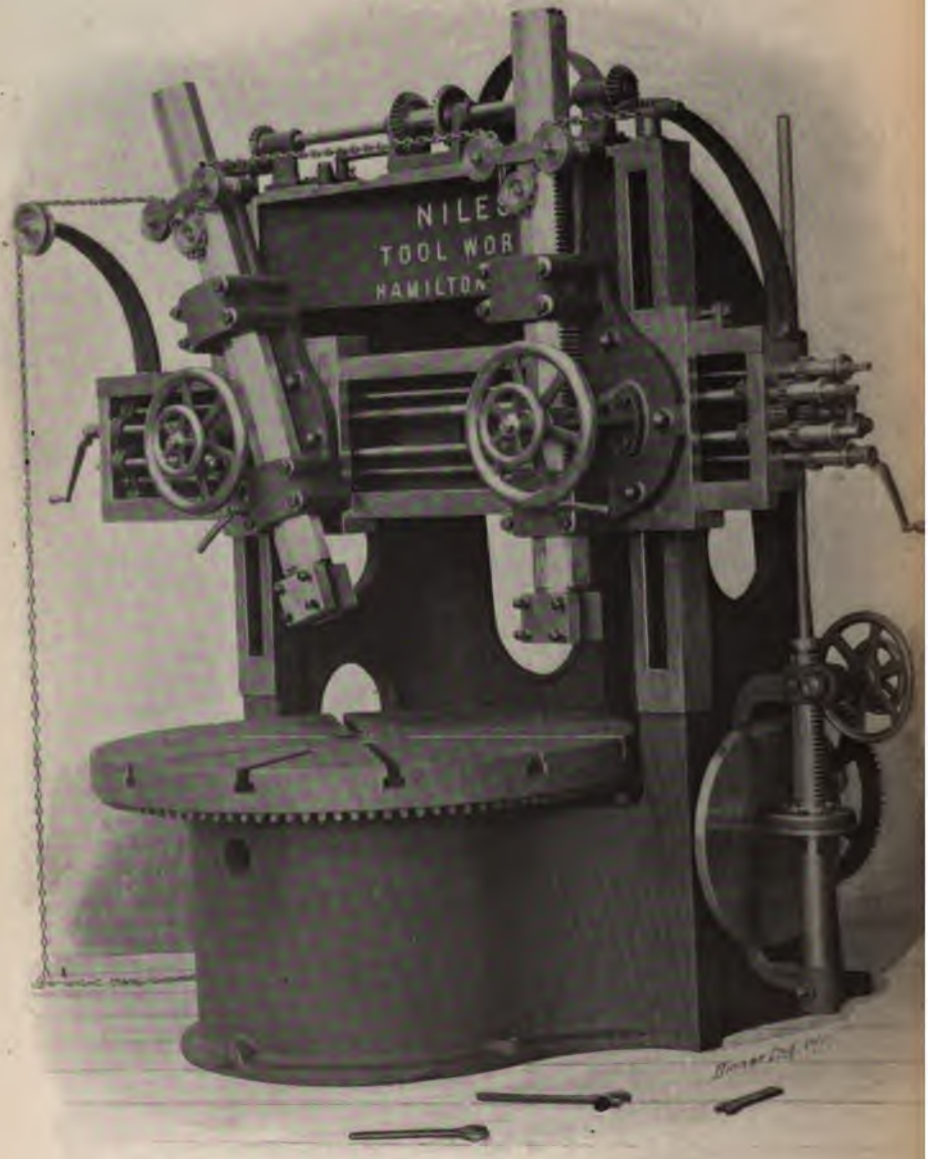
Code Word Musician. Weight .... Prtce, $ ....



A ROW OF NILES BORING AND TURNING MILLS AT WATERVLEIT ARSENAL, WATERVLEIT, N. Y.

PART XI.

BORING AND TURNING MACHINES.



51-INCH VERTICAL BORING AND TURNING MILL.

37-INCH, AND 51-INCH VERTICAL BORING AND TURNING MILLS.

Advantage has been taken of the comparatively small swing of these mills to employ a form of construction unequaled for strength and rigidity. A single casting forms what would otherwise be the bed, housing and top brace.

The driving cone is placed at the back and transmits motion to the table through accurately cut gearing. It is strongly back-geared, which, in connection with the two speeds available from countershaft, affords a wide range of speeds for the table.

Cross rail is of box-girder form, with wide bearings, raised and lowered by power. It is counterbalanced by weights suspended in the column to facilitate its easy and rapid adjustment by hand. The saddles are made right and left, allowing the boring bars to work close together.

Boring bars are of octagonal section, and they may be set over to operate at any angle. Both are counterbalanced by a single weight, so arranged as to render the weight of the bars absolutely inert, no matter in what position one or both may be placed for angular work.

The feeds are operated by a friction disk, which permits instant variation of the feed to any degree within its range. The feeds are independent, and the saddles or bars may be fed in the same or opposite directions at the same time. By means of suitable but simple mechanism the feed may be instantly reversed without shifting the friction disk.

SPECIAL HEAD FOR BORING.

This consists of a saddle mounted on the rail and carrying a boring spindle driven from a separate cone. It operates while the table remains still and has all the necessary adjustments and changes of feed and speed to make it a complete boring machine.

The cones have four steps. Tables have sixteen changes of speed. All machines powerfully back geared. 37-inch Mill: countershaft pulleys, 18 inches and 14 inches diameter, 4 inch face; 2 speeds, 155 and 190 revolutions per minute. 51-inch: countershaft pulleys, 20 inches and 16 inches diameter, 4 inch face; 2 speeds, 160 and 240 revolutions.

SPECIFICATIONS.

Code Word Machine with two Standard Heads.	Size.	Greatest Height Under Rail.	Traverse of Boring Bars.	Width of Cone Belt.	With Two Standard Heads.		Price Independent Boring Head.	Price two heads, L-H head with independent boring drive	Price two heads, L-H head with chasing attachm'nt
					Weight	Price.			
Mudfish....	37''	30''	18''	3''	....	$........	$.............	$............	$............
Muffin......	51''	36''	24''	3½''	....	$........	$.............	$............	$............

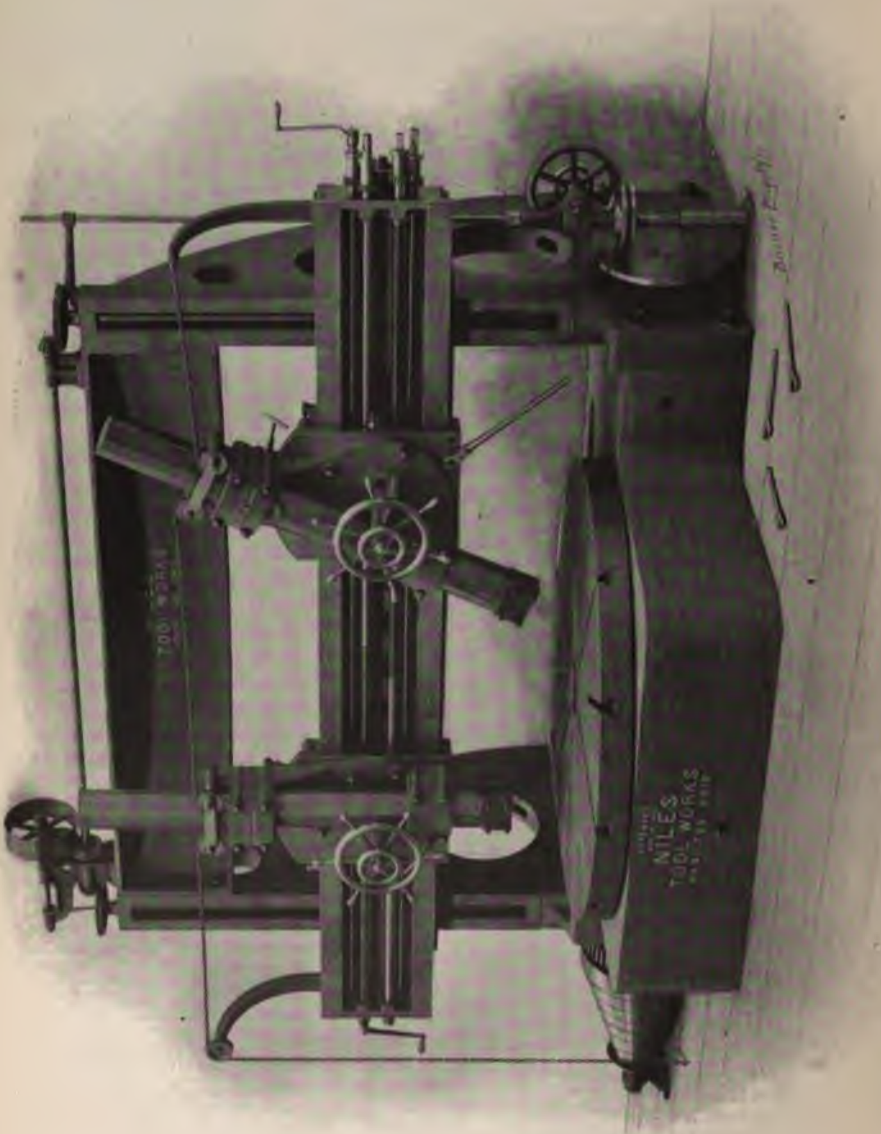
Code word.

Mudflat. 37 inch Mill with two heads; Right-hand head facing machine standard, and left-hand head arranged with independent drive for boring.

Mudstone. 37 inch Mill with two heads; Right-hand head facing machine standard, and left-hand head arranged with chasing attachment.

Mufflig. 51 inch Mill with two heads; Right-hand head facing machine standard, and left-hand head arranged with independent drive for boring.

Mufione. 51 inch Mill with two heads; Right-hand head facing machine standard, and left-hand head arranged with chasing attachment.


NILES
TOOL WORKS

NILES STANDARD VERTICAL BORING AND TURNING MILLS.

These machines are especially adapted to much of the work formerly done on pit lathes, besides having a wide field of their own.

The horizontal table offers the greatest facilities for chucking heavy work, and where a large number of small pieces are to be faced, it is often possible to cover the table with the pieces and then take a continuous cut as though the machine were a planer with an endless platen.

We have made a special study of these machines and have built all sizes ranging in weight from 5 to 160 tons and for all classes of material from soft cast iron to high grade nickel steel for tires, gun hoops, barbettes, etc.

We are prepared to build larger sizes as wanted. Up to the limits of shipping sizes the beds are cast in one piece, are strongly ribbed and well braced for all strains.

The housings are double webbed and have wide supports on bed well secured. A cross brace uniting the housings at the top gives great stability.

The cross rails are of heavy box girder section, very deep in center and with wide bearings for the saddles and housings. Power elevating gears are used on all sizes and are controlled by a convenient lever.

The saddles are wide, well gibbed to rail and are made right and left to allow the tool bars to work close together.

The bars are or octagonal section, very stiff, are held in capped bearings adjustable for wear, will swing to any angle, are perfectly counterweighted in all positions and have convenient hand adjustment by rack and pinion. We are the originators of this system of counter-weighting. This counterweight is only half as heavy as one bar, acts at all angles, does not pull the swing over and endanger the workman's life when the bolts are loosened, never interferes with moving the saddle along the rail by hand when the nuts are opened and has no overhead brackets standing away up in the air to interfere with cranes, belts or shop ceilings.

The tool holders are solid steel forgings, are held in bars by taper shanks and keys, will hold tools in horizontal or vertical positions, and are readily removable for the insertion of double end cutter bars or other special tools.

The right hand bar is carefully set exactly central with the table for the use of boring tools, double-end cutters, etc.

On all sizes above 51-inch swing the tables have an annular bearing on the bed nearly the full diameter, run in oil and have long spindles. The upper spindle bearings are cast in one with the bed, and have split taper bushes for taking up wear. The lower ends of the spindles run in oil on steel steps with brass bushings and are made adjustable vertically so that the tables may be lifted from the annular bearings for high speed on light work. A gentle tap with a hammer on the top of table will indicate when table touches. This adjustment is made by the square shaft near the floor in front of bed.

The tables on all sizes above 60-inch swing are driven by internal spur gearing of large diameter. This gives a powerful and steady drive.

All the gearing is cut from the solid, bevels are planed to correct tooth curves on special machines which are kept in accurate adjustment for this purpose.

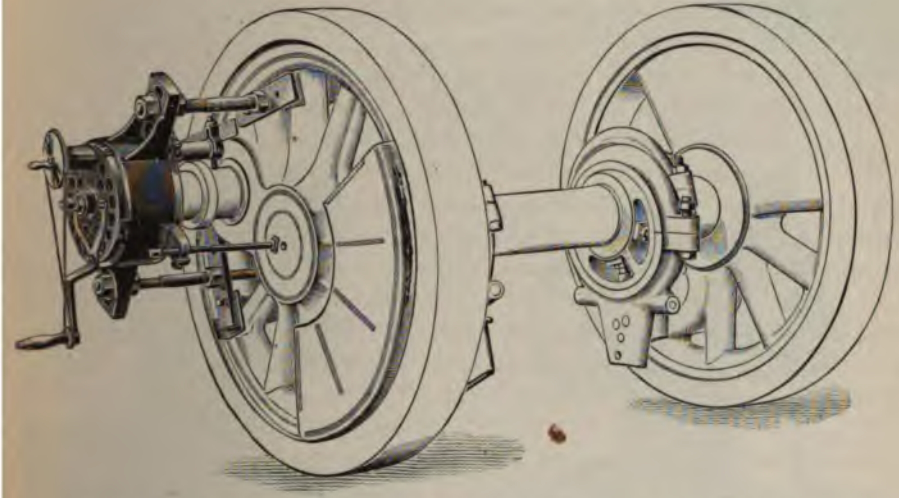
The feeds are generally driven by a high speed friction disk which gives the quickest possible adjustment and a wide range. The range of the disk is multiplied at end of rail by mechanism which makes the feeds instantly reversible and wholly independent in direction for the two heads both cross and down.

The workmanship throughout is of the best character, all sliding surfaces are scraped to bearing by hand and the spindle bearings are lapped to insure roundness of boring and turning.

SPECIFICATIONS.

Code Word.	Swing.	Height Under Rail.	Travel of Bars.	Diam of Table.	Countershaft Pulleys.			With Two Regular Heads.		Price Pulley Turning Attachment.	Price Slotting Attachment.
					Diam.	Face.	Revs.	Weight.	Price.		
Mulatto	60''	42''	30''	54''	20''	4½''	200		$	$	$
Mule	6'	48''	36''	55''	20''	4½''	200		$	$	$
Muleteer	7'	54''	36''	67''	20''	4½''	154		$	$	$
Mulish	8'	54''	36''	67''	20''	4½''	154		$	$	$
Mullet	10'	66''	42''	72''	24''	4½''	180		$	$	$
Multiform	12'	72''	48''	96''	28''	5¼''	200		$	$	$
Mumble	14'	96''	48''	120''	28''	5¼''	200		$	$	$
Mummy	16'	96''	48''	120''	36''	5¼''	150		$	$	$
Munch	10-16'	66''	48''	96''	28''	9''	110-180		$	$	$
Munching	10-16'	90''	48''	96''	28''	9''	110-180		$	$	$
Mundame	14-20'	66''	48''	120''	30''	5¼''	120		$	$	$
Municipal	14-20'	96''	48''	120''	30''	5¼''	120		$	$	$
Murder	16-24'	90''	48''	120''	30''	5¼''	125		$	$	$
Muscular	Mill to have Slotting Attachment										
Museum	Mill to have Pulley Turning Attachment										

The above sizes are standard. Size of tables, traverse of bars and height under rail, can be changed by means of special patterns we have for that purpose.



PATENT PORTABLE CRANK-PIN TURNING MACHINE.

FOR LOCOMOTIVE OR STATIONARY ENGINES.

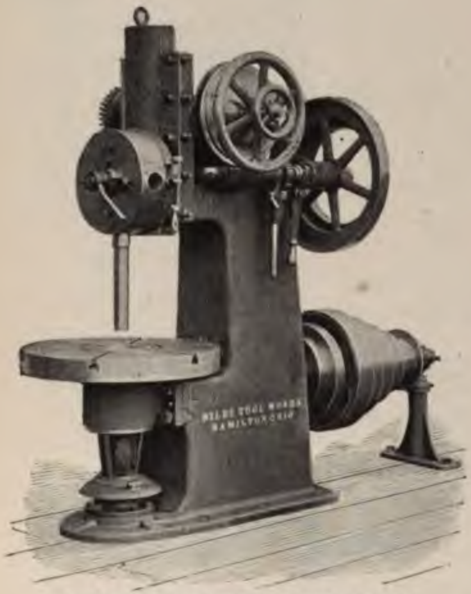
This machine will turn long or short pins either with or without collar; no offset tools are required, consequently there is no springing of the tool. By use of the pointer it can be set true with the face of the wheel or with the bore in the hub of the wheel, where there is no collar; this makes it run perfectly true with the orignial turning of the pin.

A large shell is used to carry the cutter and act as a frame and guide for the tool. Inside of this shell there is a second shell that revolves, carrying a tool-post with it, this tool-post being fed out and in by a screw, operated either by hand or the small belt shown. With this device not only the bearing, but the faces of the collars, can be trued up. When it is desired to turn the inside bearing of a main pin an extension to the tool-post is screwed into place, as shown in the engraving. The machine will true up all pins from 4 to 8½ inches in diameter.

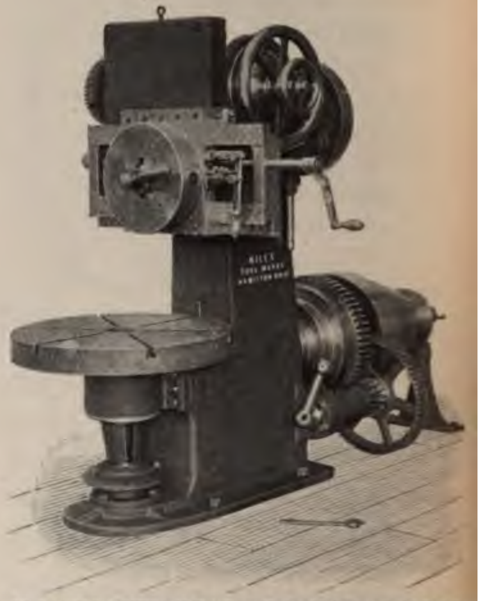
Code Word, Pinturn.

Shipping Weight, 335 lbs.

Price $........................



30-INCH VERTICAL TURRET BORING MACHINE.



30-INCH VERTICAL TURRET BORING AND TURNING MACHINE.

VERTICAL TURRET BORING MACHINES.

The advantages obtained from the use of these machines are found in the improvement in quality and quantity of product resulting from convenience in setting the work on horizontal table, the saving in time in having the turret supplied with all the cutter bars necessary to perform each operation without change, the hand feed allowing the working of very small holes, the quick return, the range of speeds and feeds and the reduced expenses for repairs.

With the horizontal table the work can be set without temporary clamping.

The turret head, arranged with four holes to carry drills, cutter-bar, counter-bore and reamer or any other combination of cutting tools suitable for the work intended, can be operated so quickly, and the adjustments are so carefully made, that a material reduction in time and absolute accuracy in the work can be obtained.

With special tap holder or reversing pulleys, ordinary tapping can be expeditiously done.

Pieces requiring facing can be finished with wide cutter and hand feed.

Lathe chuck can be attached to table for regular work and top of spindle arranged to support lower end of tool holder, when so desired.

Range of speeds,obtained through large cone, bevel pinion and rack,is sufficient for general run of work.

Feeds are positive and designed for quick adjustment.

Bed is strongly braced and from its peculiar shape offers the greatest resistance to strains due to heaviest cuts.

Slide is long and securely carried in frame, making spring and chatter impossible.

Table is heavy and supported on spindle with large bearings.

Spindle thrust is taken on anti-friction bearing at bottom of bed.

Main bearing is independent, removing all wear from bed, making cost of repairs on part subjected to greatest wear a minimum amount.

Openings in spindle permit borings to reach the floor, the bearings being amply protected against dust.

Gearing all cut from the solid. Wearing surfaces accurately fitted.

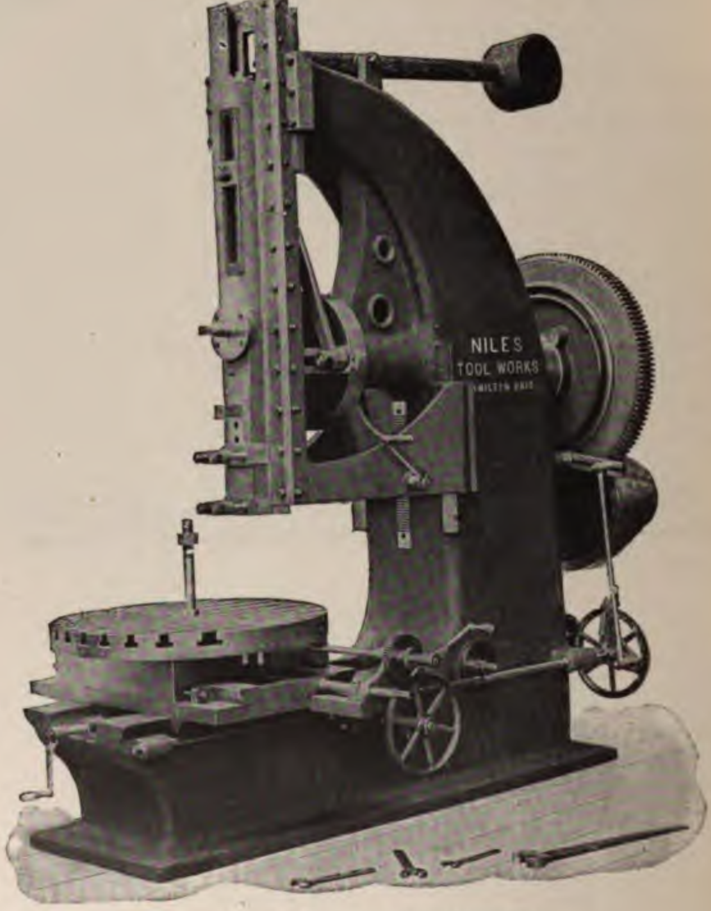
Swing, 30-inches diameter. Bores 14-inches deep. Speed, 5 changes, 4-inch belt. Feeds, 3, for drilling and boring.

30 inch Borer: Countershaft pulleys, 20 inch diameter, 4½ inch face. Speed, 80 revolutions. 30 inch Borer and Turner Countershaft pulleys, 20 inch diameter, 4½ inch face. Speed, 110 revolutions.

Code Word, 30-inch Borer, Music. Weight, ... Price, $..............
" " 30-inch Borer and Turner, Musical. Weight, ... Price, $..............

PART XII.

SLOTTING MACHINES.



18-INCH SLOTTING MACHINE.

SLOTTING MACHINES.

CRANK AND GEARED PATTERNS, HEAVY AND POWERFUL.

Our slotters are built from the latest designs and with special reference to great cutting power, smooth running and convenience of handling.

All the crank-driven machines have the Whitworth motion and feed driven by a large cam, very quick, yet smooth in action. Cranks are adjustable from 0 to full stroke by screws. The rams may be set for high or low work as desired and the guide-frames are also adjustable—on sizes from 14 inches up—so that the tool-bars are rigidly held as near the work as possible.

Cranks are provided for all these movements within easy reach of the operator while watching the cut.

Tables have longitudinal, cross and circular feeds all taking place at the top of stroke, the full rated length of which is below the feed.

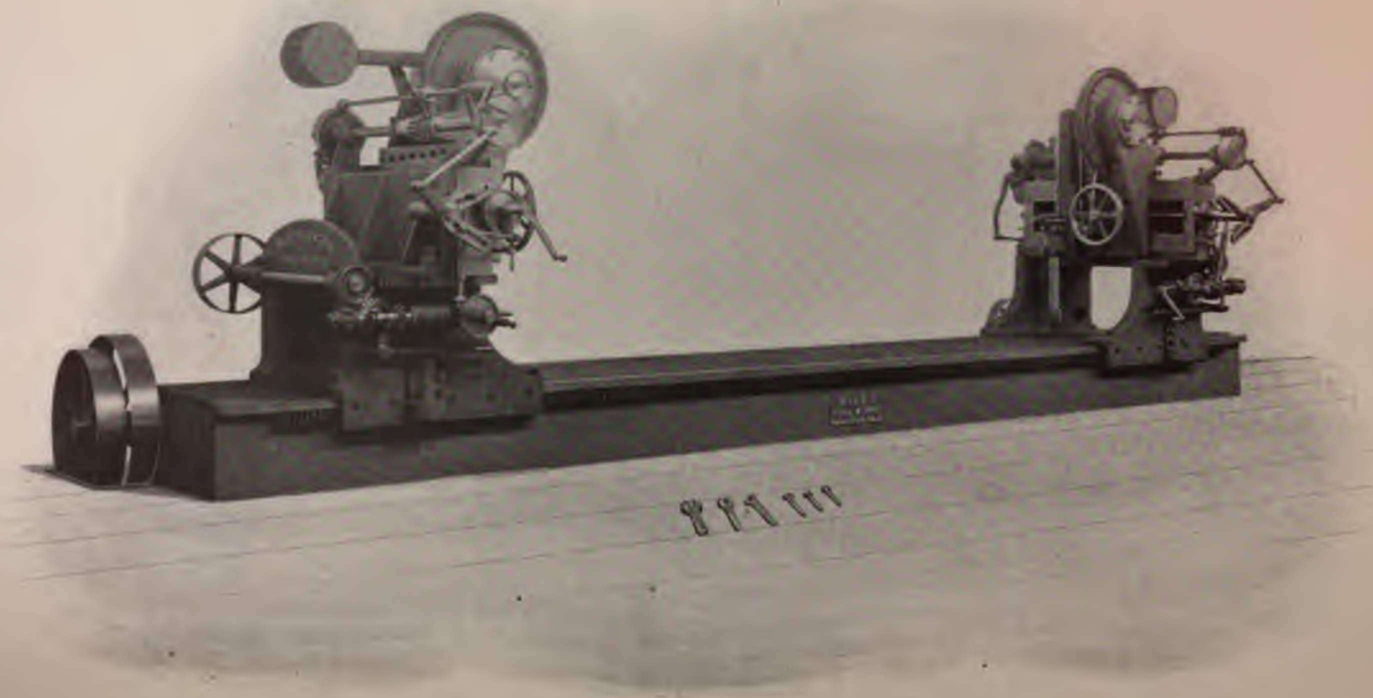
The tool rams are all counterweighted. Gearing is all cut from the solid.

Crank Slotters are built with the following strokes: 6½, 10, 14, 16, 18, 20, 26 and 30 inches.

Geared slotters 24, 36, and 40 inches stroke have tool rams driven by pinion in rack from worm and wheel being similar to our planer drive and quick return. The 54 inche slotter is spur gear drive.

TABLE OF SIZES.

Code Word.	Stroke.	Greatest Height Under Ram Guide.	Diam. of Work.	Countershaft Pulleys.			Weight	Price.
				Diam.	Face.	Rev.		
Mouse........	6½"	8"	36"	24"	5"	120	....	$........
Mouthful....	10"	12"	48"	20"	4½"	120	....	$ ....
Movable	14"	17"	60"	20"	4½"	150	....	$........
Mover	16"	19"	72"	20"	4½"	175	....	$........
Mucid	18"	21"	78"	24"	5"	110-136	....	$ ....
Mucilage....	20"	23"	78"	24"	5"	110-136	....	$........
Muckea......	24"	27"	80"	22"	5"	270	....	$........
Muckerei....	26"	29"	80"	30"	6"	60	....	$........
Mucus........	30"	33"	94"	26"	5½"	110	.. ..	$........
Mucusino..	36"	39"	108"	30"	6"	200	....	$. ....
Mudada......	40"	43"	108"	30"	6"	200	....	$........
Muddy..	54"	57"	120"	54"	7"	115-230	....	$........



DOUBLE HEAD FRAME SLOTTING MACHINE.

FRAME SLOTTING MACHINES.

TWO AND THREE HEADS.

These machines are powerful and convenient tools embodying in their construction all the latest features. All adjustments are accurately made and all sliding parts are provided with method of taking up wear. Only one countershaft is used from which all driving, traversing and feed movements are taken; requires only one belt from counter to machine, thus leaving the entire working surface of the bed to be covered by a traveling crane for handling the work; also allows heads to pass the center of bed, as no center joint has to be provided in the driving-shaft and no traversing screw is used.

The illustration shows Double-Head Frame Slotting Machine with rams 17 inches stroke, operated by Whitworth quick return, and cross travels of 30 inches. Revolving tool-holders are provided.

Feeds are independent.

Power adjustment along the bed is taken from the main driving-shaft with reversible clutches, so that the heads are entirely independent.

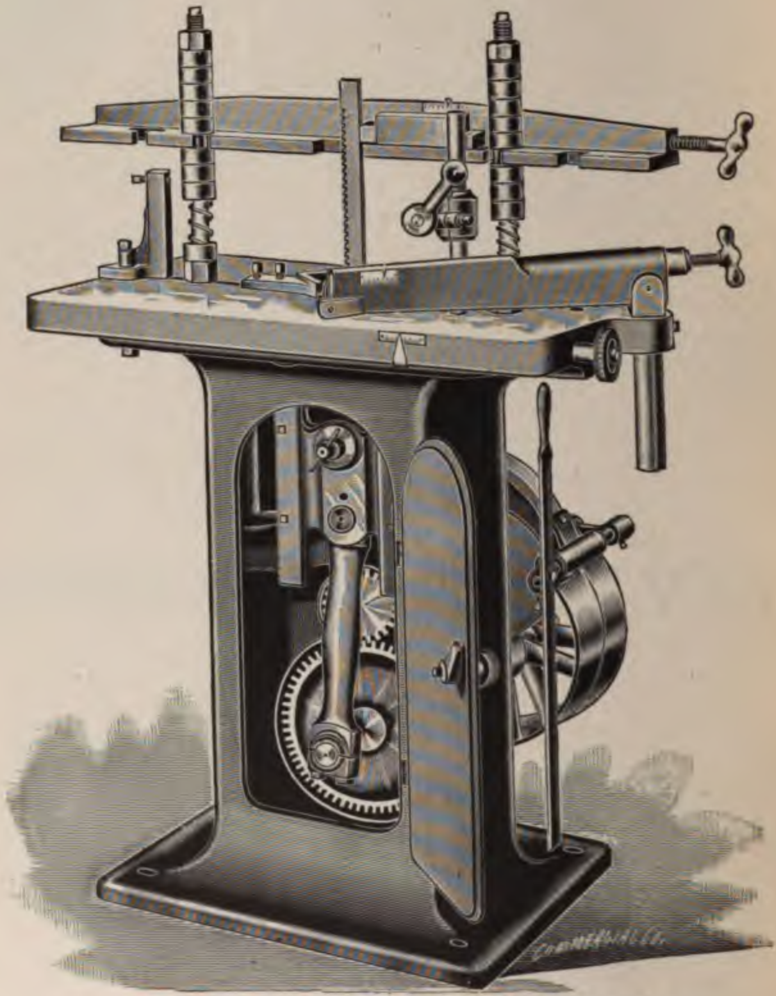
Heads will swivel to cut angles up to 1 1-8 inches in 10 inches.

SPECIFICATIONS.

Code Word.	No. of Heads.	Countershaft Pulleys				Weight.	Price.
		Diam.	Face.	Width of Belt.	Rev.		
Muddying......	2	30″	7″	6″	145	....	$..............
Mudeel........	3	40″	7″	6″	145	....	$..............

PART XIII.

KEY-SEATING MACHINES.



IMPROVED No. 1 KEY-WAY CUTTING MACHINE.

KEY-SEATING MACHINES.

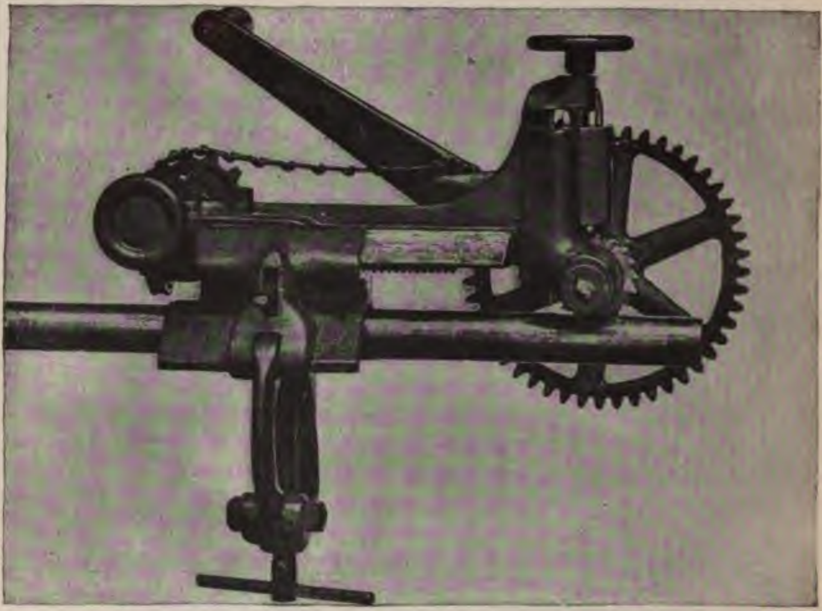
The cut shows a new and improved Key-Seating Machine. The machine is complete with heavy clamping bar for large work, also special clamping lever for small work. This machine will do all work accurately and quickly, the feed is automatic which prevents the breaking of cutters, and is intended for all machine shops having internal key-seating to do. The work can be placed in this machine and finished in the time other machines are being made ready. The depth and taper of key-seats are measured accurately by scales and pointers, and any number of key-seats can be cut of any given depth and taper.

SPECIFICATIONS.

Code Word.	No. of Machine.	Will Cut Seats From	Shipping Weight.	Price.
Forfaire	1	¼" to 1"		$125.00
Forfang	2	⅛" to ⅝"		75.00

PRICE OF CUTTERS FOR EITHER MACHINE.

¼ inch	$2.00
5-16 inch	2.25
⅜ inch	2.50
7-16 inch	2.75
½ inch	3.00
9-16 inch	3 25
⅝ inch	$3.50
11-16 inch	3.75
¾ inch	4.00
13-16 inch	4.25
⅞ inch	4.50
1 inch	5.00



PORTABLE KEY-SEATER.

DESCRIPTION.

This machine will mill key-seats any length in shafting from $1\frac{1}{4}$ inches to $4\frac{3}{4}$ inches in diameter, and the following widths: $\frac{1}{4}''$ $\frac{5}{16}''$ $\frac{3}{8}''$ $\frac{7}{16}''$ $\frac{1}{2}''$ $\frac{9}{16}''$ $\frac{5}{8}''$ $\frac{11}{16}''$ $\frac{3}{4}''$ $\frac{13}{16}''$ $\frac{7}{8}''$ $\frac{15}{16}''$ $1''$ $1\frac{1}{16}''$ and $1\frac{1}{8}$ inches, and any depth not exceeding $\frac{5}{8}$ inch without removing the shafting from its hangers or boxes. Each machine is furnished with six milling cutters, which by placing one or more on the spindle of the machine, key-seats the sizes mentioned above, can be cut at one operation the width required.

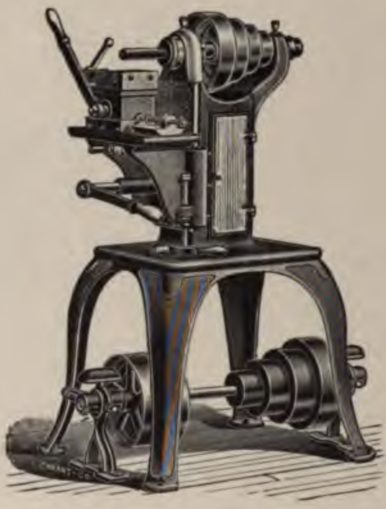
When the cutters are kept sharp the machine will mill all key-seats up to $\frac{3}{4}$ inches wide, by $\frac{3}{8}$ inches deep at one operation, but for the wider key-seats it will be necessary to go over the work two or more times, according to the depth required.

The machine is provided with either automatic or hand feed while cutting, and has a dial to shove the depth cut in the shaft. The machine will mill four inches before it is necessary to move the base forward on the shaft. An operator can easily cut a key seat 12 inches long, $\frac{5}{8}$ inches wide, 5-16 inches deep, in one hour, and other sizes in proportion.

Price of machine with cutters, $40 00, net. Weight of machine, forty-five pounds.
Code Word, Forfeit.

PART XIV.

MILLING MACHINES.



SMALL HAND MILLING MACHINE.

Arranged generally like the larger machine, shown on next page, but with some changes in its details. The knee is moved by a lever, instead of the attachment on carriage. This plan allows the platen to be kept low and very close to carriage, resultiing in smoother work.

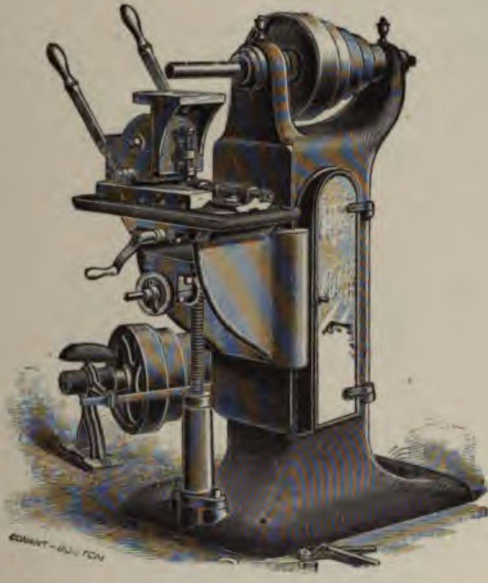
It has 4 speeds for 2-inch belt; cross motion of table on knee, 2½ inches. Two adjustable levers work the carriage both horizontally and vertically 4 inches. Weight about 700 lbs.

Speed of Countershaft	140 Revs.
Diam. Tight and Loose Pulleys	10 inches
Face " " " "	2¾ "

Price, $..........................

" with vise, $..........................

Code Word, machine complete, Forficis.



LARGE HAND MILLING MACHINE.

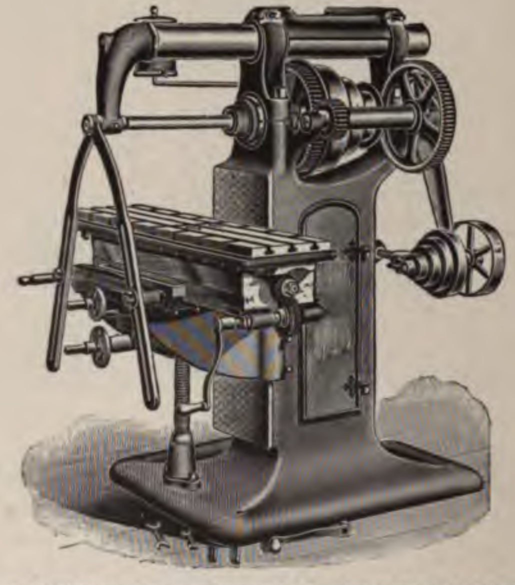
The driving cone has five speeds for a 2-inch belt; crucible steel spindle, running in compensating bearings; perpendicular range, 15 inches, adjustable to thousandths of an inch; cross motion of table upon knee, 5 inches. The knee is elevated or lowered by a crank and bevel gearing. A dial on crank shaft registers in thousandths of an inch the movement of the knee and appendages. The hand attachment is worked by two adjustable levers, the movement horizontally being 8 inches, and vertically, 7 inches.

Speed of Countershaft	140 Rev.
Diam. Tight and Loose Pulleys	10 inches
Face " " " "	2¾ "
Weight about	1000 lbs.

Price, $ ....

" with vise, $ ....

Code Word, machine complete, Forficola.



No. 1 STANDARD UNIVERSAL MILLING MACHINE.
STYLE B.

STANDARD UNIVERSAL MILLING MACHINES, STYLE "B."

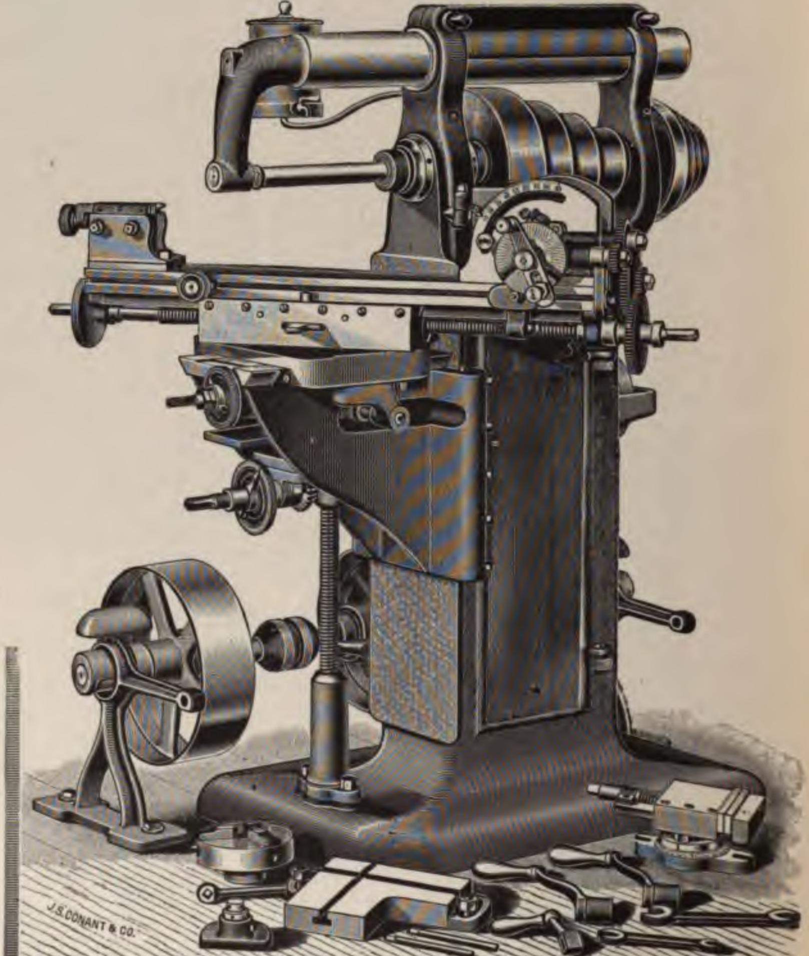
These machines are the result of years of experimenting with feeds in all directions, and can now be furnished with automatic feed, not only longitudinally, backward and forward, but vertically and also in line with the spindle. These feeds do not in any way interfere with each other and are all thrown out automatically at any point.

Two or more feeds can be run in combination.

Other sizes can now be fitted with these feeds.

SPECIFICATIONS.

	Back Geared.			Not Back Geared.		
	No. 1	No. 2	No. 3	No. 4	No. 4½	No. 5
Automatic longitudinal feed	36"	26"	20"	18"	16"	9"
Vertical range below spindle	27"	21"	21"	16"	16"	7"
Cross motion in line with spindle	12"	8½"	8"	5"	5"	3"
Working surface of table	50x12"	40x10"	30x8"	27x7½"	24x7¼"	18x5"
Length of table bearings in carriage	42"	33"	24½"	21⅞"	21"	14"
Number of Speeds for driving belts, 2 steps	6	6	6	5	4	5
Width of driving belt	4"	3½"	3"	2½"	2½"	2"
Number of changes of feed for each speed	8	4	4	4	4	4
Size of cutter that can be used under arm	18"	12"	12"	8"	10"	No arm.
Will mill out from column	18"	16"	13"	12"	13"	
Speed of countershaft	100 rev.	120 rev.	120 rev.	120 rev.	130 rev.	130 rev.
Diameter of tight and loose pulleys	18"	16"	14"	14"	12"	10"
Face of tight and loose pulleys	4½"	4"	3½"	3½"	2½"	2½"
Floor space	74x56"	62x45"	50x33"	47x30"	39x28"	36x25"
Shipping weight	5400 lbs.	3500 lbs.	2200 lbs.	2000 lbs.	1200 lbs.	900 lbs.
Price, with countershaft, no attachments	$	$	$	$	$	$
Code word " " " "	Forge	Forgeron	Forgetful	Forgetive	Forgetter	Forgicar


J.S. CONANT & CO.

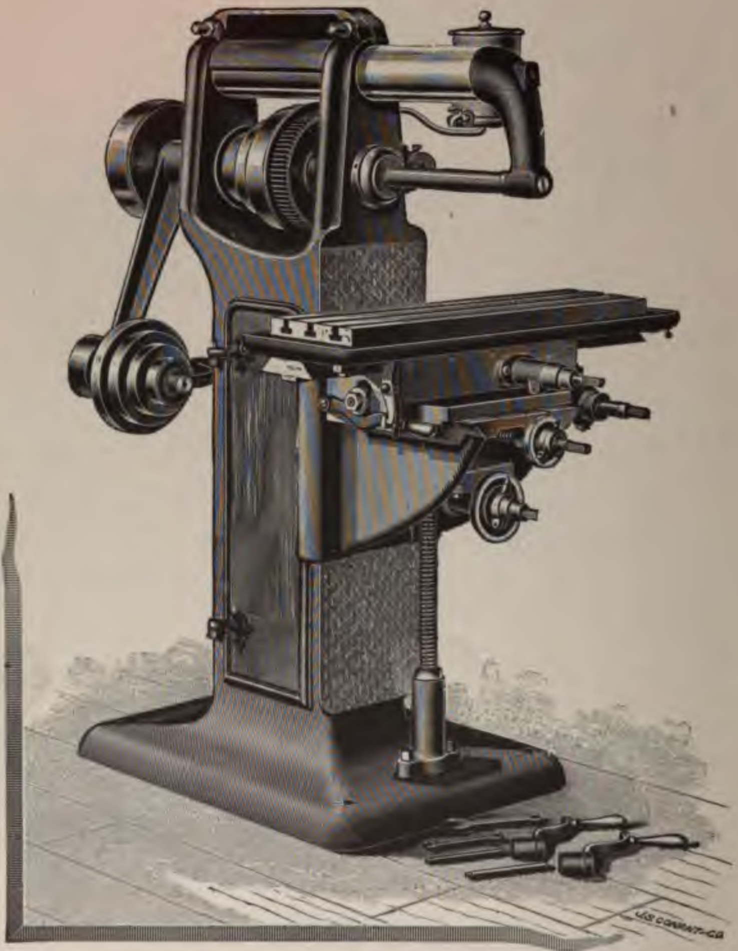
TOOL-ROOM UNIVERSAL MILLING MACHINE
STYLE B.

NEW TOOL-ROOM UNIVERSAL MILLING MACHINES.

STYLE B.

SPECIFICATIONS.

	Back Geared.			Not Back Geared.	Back Geared.	Not Back Geared.
	No. 11.	No. 12.	No. 13.	No. 14.	No. 14½.	No. 15.
Automatic longitudinal feed	42"	27"	24"	20"	21"	18"
Vertical range below spindle	23"	21"	20"	18"	18"	16"
Cross motion in line with spindle	9"	8"	8½"	8½"	6½"	6"
Working surface of table	64x10"	48x9½"	40x8¼"	39x6½"	36x8"	35x5½"
Length of table bearings in carriage	39"	20"	16½"	16½"	15½"	14½"
Centers will swing	15"	12½"	10¼"	10¼"	10"	8¼"
Centers will take in length	44"	26"	24"	21"	21"	18"
Number of speeds for driving belt	6 or 12	6 or 12	6 or 12	4 or 8	8 or 16	4 or 8
Width of driving belt	4"	3½"	3"	3½"	2½"	3"
Number of changes of feed for each speed	4	4	4	4	16	4
Size of cutter that can be used under arm	18"	14½"	13"	13"	12½"	11"
Speed of countershaft	120 & 102 rev.	130 & 111 rev.	120 & 102 rev.	120 & 102 rev.	180 & 120 rev.	130 & 111 rev.
Diameter of friction pulleys	18 & 16"	12 & 14"	12 & 14"	12 & 14"	12 & 14"	12 & 14"
Face of friction pulleys	4½"	4¼"	3½"	4	4"	3½"
Floor space	74x74"	62x 2"	53x50"	49x51"	50x48"	47x45"
Shipping Weight	5400 lbs.	3800 lbs.	2350 lbs.	2100 lbs.	2100 lbs.	1975 lbs.
Price, complete, with all attachments	$	$	$	$	$	$
Code word " " " "	Forillo	Forirem	Forkless	Forlane	Forlipon	Forlorn



UPRIGHT PLAIN MILLING MACHINE. STYLE B.

UPRIGHT PLAIN MILLING MACHINES.

STYLE B.

SCREW FEED, RACK AND PINION RETURN.

This style of machine, because of its quickness of movement and ready adjustment, is especially adapted for manufacturing purposes.

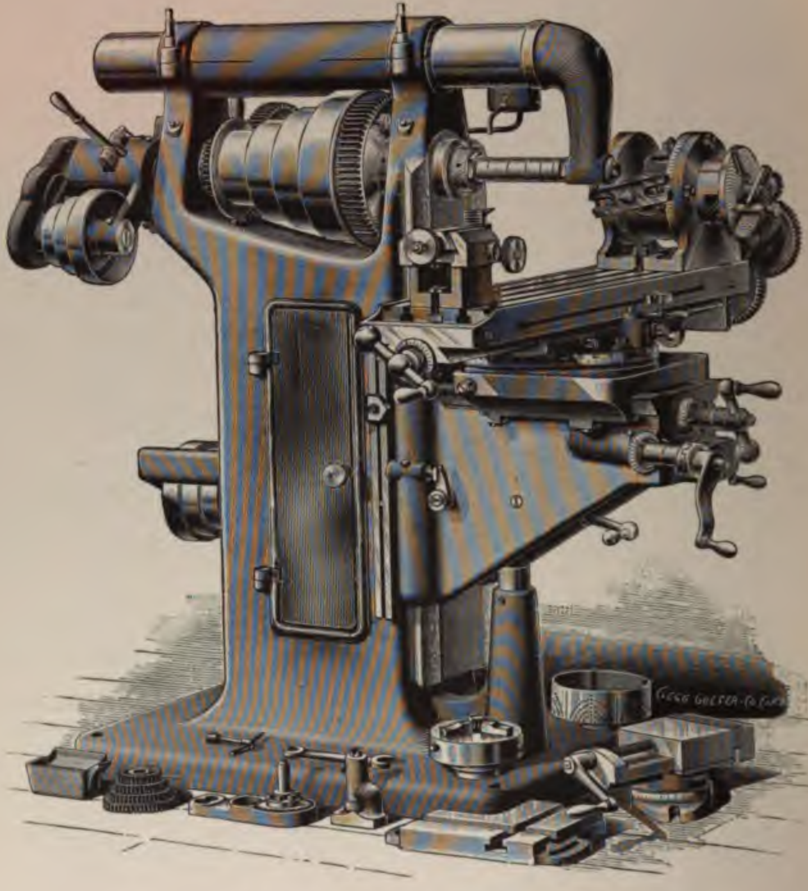
The automatic feed is by a worm running in a rack, the teeth of which are worked out to exactly fit the worm. A spiral pinion, connected with a crank shaft, also engages the rack, and runs as an idler when the machine is feeding automatically. When the automatic feed is tripped the worm drops clear of the rack, and the table is run back by means of the spiral pinion direct, at the rate of 3 inches for each turn of the crank. This combination of screw feed, and rack and pinion return, is perfect, giving the advantages of both kinds of feed without the disadvantages of either.

The bearings of work-table in carriage are very long, and the length of feed is limited only by the length of table. Work table has 3 longitudinal slots and oil or tool pan at each end.

All the attachments for Standard Universal Machines can be used on this style.

SPECIFICATIONS.

	Back Geared.				Not Back Geared.	
	No. 20.	No. 21.	No. 22.	No. 24.	No. 25.	No. 26.
Automatic longitudinal feed	72″	66″	48″	33″	30″	27″
Vertical range below spindle	25″	23″	21″	20″	20″	16″
Cross motion in line with spindle	14″	11½″	8½″	6″	5″	5″
Working surface of table	72x16″	59x16″	48x14″	33½x9″	30x8″	27x9″
Length of table bearings in carriage	60″	48″	36″	17½″	17½″	22″
Number of speeds for driving belt	12	12	6	6	4	4
Width of driving belt	4½″	4″	3½″	3″	3″	2½″
Number of changes of feed for each speed	10	10	10	4	4	4
Speed for countershaft	110 & 150 rev.	110 & 150 rev.	130 rev.	130 rev.	130 rev.	120 to 130 rev.
Pulleys on countershaft	Friction.	Friction.	T & L	T & L	T & L	T & L
Diameter of countershaft pulleys	18 & 22″	16x18″	16″	14″	14″	10″
Face of counter pulleys	6″	5″	4″	3½″	3½″	2½″
Floor space	80x78″	74x66½″	61x54″	50x38″	48x35″	38x31″
Shipping Weight	8000 lbs.	5800 lbs.	3400 lbs.	2200 lbs.	1800 lbs.	1150 lbs.
Price, with countershaft, no attachments	$	$	$	$	$	$
Code word, with countershaft, no attachment	Formabit	Formacao	Formador	Formadura	Formage	Formaggio



No. 3 UNIVERSAL MILLING MACHINE.

STYLE C.

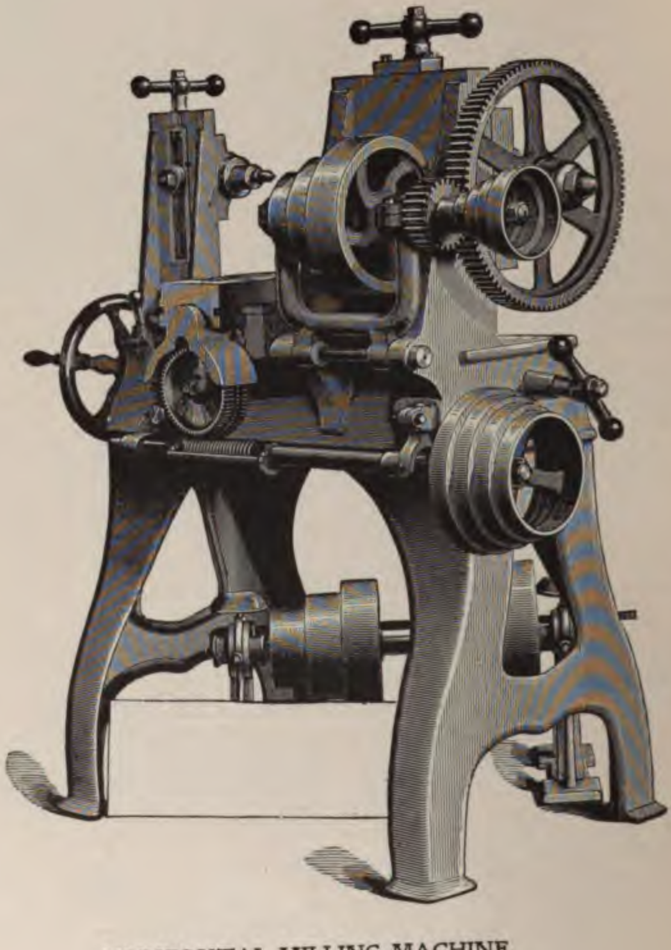
For Specifications see opposite Page.

UNIVERSAL MILLING MACHINES, STYLE C.

	Not Back Geared.	Back Geared.		
	No. 1	No. 1½	No. 2	No. 3
Length of automatic feed to table	20"	20"	23"	28"
Vertical range	17"	17"	18½"	19"
Cross motion in line with spindle	6"	6"	6½"	7½"
Working surface of table	33x6½"	33x6½"	35x8⅜"	43x9½"
Size of table over all	35x6½"	35x6½"	38x8⅜	46x9½"
Largest diam. of driving pulley	12"	10"	10"	11½"
Number of steps on driving pulley	4	4	4	4
Width of driving belt	3"	2½"	2¾"	3"
Number of spindle speeds	8	16	16	16
Number of feed changes	8	12	12	12
Varations in feed to 1 rev of spindle	.004 to .070	.006 to .150	.006 to .150	.006 to .150
Width of feed belt	1¼"	1½"	1½"	1½"
Cen. of spindle to overhanging arm	6¼"	6¼"	5 9/16	6 7/16
Diam. of overhanging arm	3¾"	3¾"	4"	4½"
No. of B & S taper hole in spindle	10	10	10	11
Diam. of hole in spindle	11/16"	13/16"	13/16"	13/16"
No. of vise furnished	1 Swiv.	1 Swiv.	1 Swiv.	2 Swiv.
Index centers swing	10"	10"	10"	12"
Index centers take in length	15"	15"	17"	21"
Speeds of countershaft	80 & 150	90 & 150	90 & 150	90 & 150
Size of countershaft pulleys	3x12"	3x12"	3½x12"	3½x12"
Floor space	69x58"	69x58"	82x68"	98½x72"
Shipping weight, about	2200 lbs.	2300 lbs.	2400 lbs.	3100 lbs.
Dimensions of box for export	56x37x62	56x37x62	63x46x62	66x50x66
Price	$	$	$	$ ....
Code word	Formalium	Formalize	Formally	Formaron

PLAIN MILLING MACHINES, STYLE C.

	Not Back Geared.		Back Geared.	
	No. 0	No. 1	No. 2	No. 3
Length of automatic feed to table	18"	21"	24"	32"
Vertical range	14"	19"	19"	20"
Cross motion in line with spindle	5½"	6"	7½"	9"
Working surface of table	27½x8"	30x9"	34⅝x10"	45x12"
Size of table over all	32½x8"	36x9"	40⅝x10"	51x12"
Largest diam. of driving pulley	10"	12"	10"	11½"
Number of steps on driving pulley	4	4	4	4
Width of driving belt	2½"	3"	2¾"	3"
Number of spindle speeds	4	8	16	16
Number of feed changes	8	8	12	12
Varations in feed to 1 rev. of spindle	.005 to .100	.005 to .100	.006 to .187	.006 to .187
Width of feed belt	1¼"	1¼"	1½"	1½"
Cen. of spindle to overhanging arm	5⅝"	6⅛"	5 9/16	6 7/16"
Diam. of overhanging arm	3¼"	3¾"	4"	4½"
No. of B & S taper hole in spindle	9	10	10	11
Diam. of hole in spindle	11/16"	13/16"	13/16"	13/16"
No. of vise furnished	1 Swiv.	1 Swiv.	1 Swiv.	3 Plain.
Speed of countershaft	130	80 & 150	90 & 150	90 & 150
Size of Countershaft pulleys	3x12"	3x12"	3½x12"	3½x12"
Floor space	70x51"	76x61"	82x68"	98½x72"
Shipping weight, about	1460 lbs.	2000 lbs.	2300 lbs.	3100 lbs.
Dimensions of box for export	51x45x57	58x50x62	63x54x62	66x64x66
Price	$	$	$	$ ....
Code word	Formatello	Formation	Formative	Formatrice



HORIZONTAL MILLING MACHINE.
STYLE, B.

HORIZONTAL MILLING MACHINES.

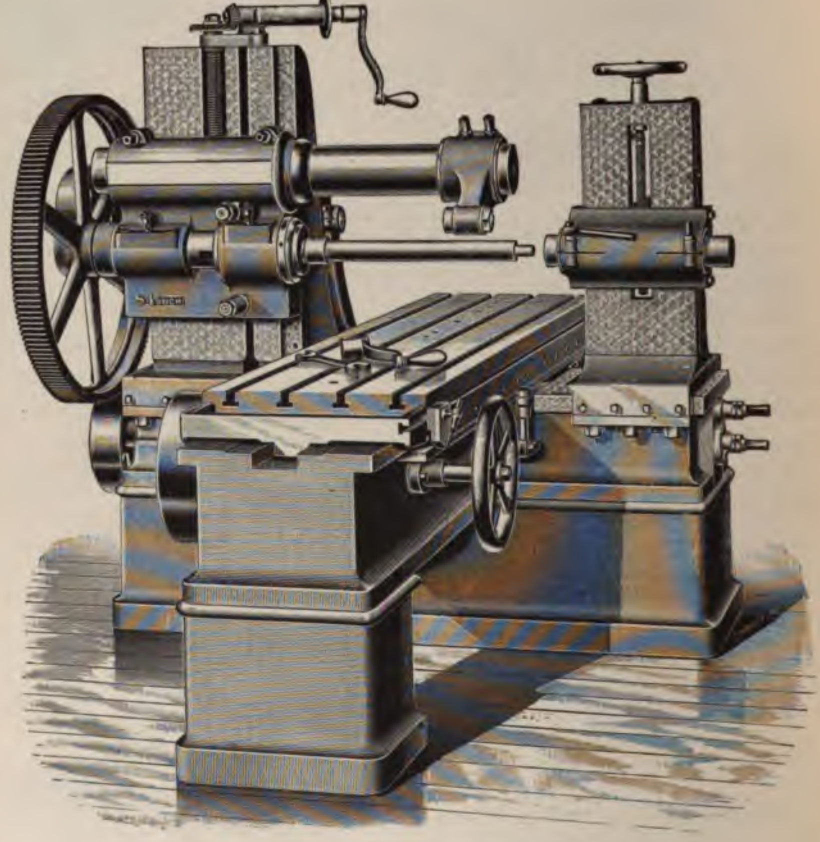
STYLE B.

In this type of machines the table remains of a fixed height while the spindle is raised and lowered to suit thickness of work. This class of machines is adapted to work done on table or in vise and of any moderate depth and generally to situations where duplicate pieces are to be made in large quantities.

The so-called Plain machines of the general character illustrated opposite are of four sizes. They are extremely heavy and rigid for their capacity, and all details are of the best possible character for power, accuracy and durability. The No. 8 is made with overhanging arm instead of tail stock, and the No. 7 also, if preferred.

SPECIFICATIONS.

	No. 6	No. 6½	No. 7	No. 8
Automatic longitudinal feed	41″	36″	13″	10½″
Greatest height of spindle center above table	12½″	11⅛″	8″	6½″
Least height of spindle center above table	2½″	⅞″	1½″	1
Cross motion in line with spindle	6″	6″	5½″	4⅝″
Working surface of table	47x12″	36x10″	28½x8″	24x6″
Length of table bearings in carriage or saddle	28″	28″	16″	14″
Number of speeds for driving cones	4	3	3	3
Number of speeds for feed cones	4	4	4	4
Width of driving belt	3″	3″	2½″	2½″
Distance bet. head and foot stands	24″	18″	17½″	
Diam. of tight and loose pulleys on countershaft	14″	14″	12″	10″
Face of tight and loose pulleys on countershaft	4″	4″	3⅝″	2½″
Speed of countershaft	135 rev.	140 rev.	100 to 120	100 to 110
Floor space	66x52″	60x12″	56x32″	45x25″
Shipping weight	3500 lbs	2750 lbs.	1750 lbs.	1200 lbs.
Price	$	$	$	$
Code Word	Formaturos	Formella	Formellis	Formend



EIGHTY-FOUR INCH MILLING MACHINE.
STYLE B.

EIGHTY-FOUR INCH MILLING MACHINE.

STYLE B.

This machine is massive in all its parts, and is intended for heavy milling of any description, but more particularly for shafting, railroad or engineering shops, being especially adapted for key-seating long and heavy shafting, finishing guide bars, connecting rods, etc.

It has both arm centre support and back stand, each being removable as required by the nature of the work. Has quick automatic return motion of table. Sets low on 4 box legs.

The method of driving the spindle allows of its free adjustment without disarrangment of the driving and feed belts. The driving cone has 3 steps for 3½-inch belt, or 2 steps for a 5 inch belt.

It it actuated by a bronze or steel worm, running in oil, driven by a hardened steel worm and worm wheel.

All the operations of the machine are intended to be conducted from the front side, without change of place by the operator.

A very massive, yet most convenient tool.

Weight, about	8500 lbs
Work table	7 feet long by 20 inches wide
Length of feed	84 inches
Spindle of hammered cast steel	4 inch diam
Centre of spindle elevates above table	19 inches
Greatest distance between head and tail stock	36 inches

The above style of Horizontal Milling Machines are made in sizes as follows:

Sizes.	50″	72″	84″	96″	108″	132″
Weight.	....	....	....	....	....	....
Price.	$	$	$	$	$	$ ....
Code Word.	Formerly......	Formful......	Formianos....	Formiate......	Formica...	Formicaire.

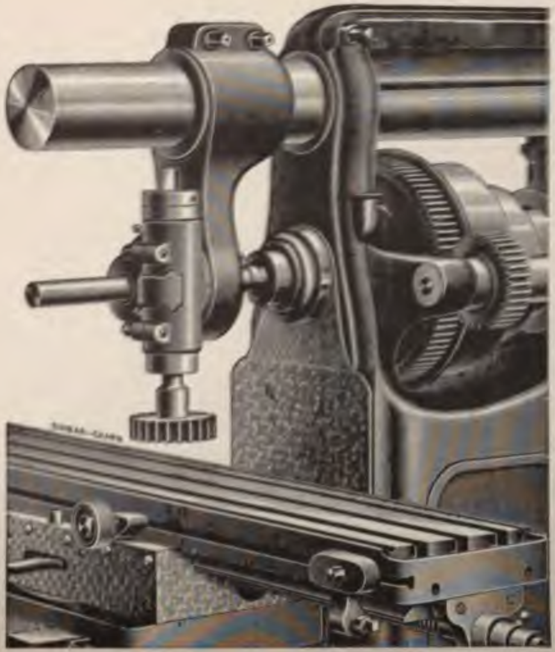


Fig. 1.

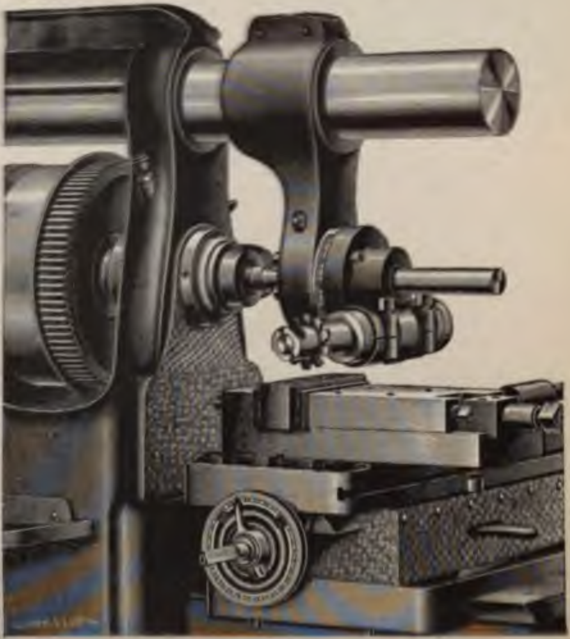


Fig. 2.

VERTICAL SPINDLE MILLING ATTACHMENTS.

STYLE B.

ATTACHMENTS FOR "STYLE B" MILLING MACHINES.

VERTICAL SPINDLE MILLING ATTACHMENT.

For all sizes of the preceding machines. This attachment is usually hung on the supporting arm of machine, and the spindle is driven by a splined arbor fitted to the taper of machine spindle. This arbor operates a pair of spiral gears, one of bronze and the other of steel, the attachment running at the same speed as the machine spindle, and having the whole power of the machine behind it.

The vertical spindle runs in compensating bronze bearings, and the cutter arbor is drawn up or thrust out by turning top screw head to the right or left.

The rotary part on the front is graduated to degrees, and can be set at any angle from the vertical to the horizontal.

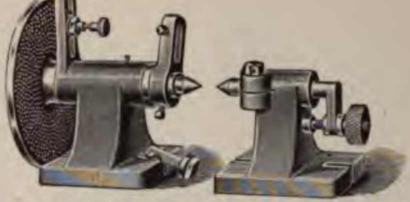
Fig. 1 shows the attachment as used for face milling, or vertical drilling. Fig. 2, as used for rack cutting on the Tool-Room Universal Milling Machine, Style B, pages 200, 201.

Attention is called to the fact that for rack cutting no special fixtures are necessary. A cutter of the required pitch is placed on the regular arbor, the rack can be held in a vise, as shown, while the dial at the end of the table, and graduated to thousandths of an inch, makes the necessary divisions with great accuracy.

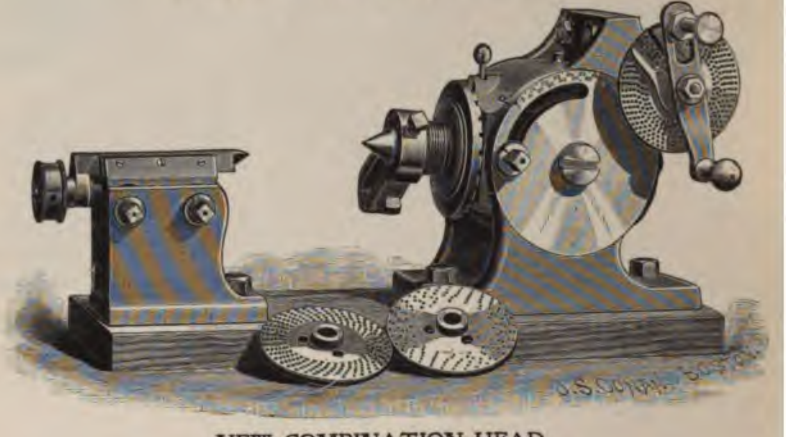
The finger on dial is held by friction only and should be returned to zero after each division.

These attachments will interchange among any of these milling machines of the same size and style B.

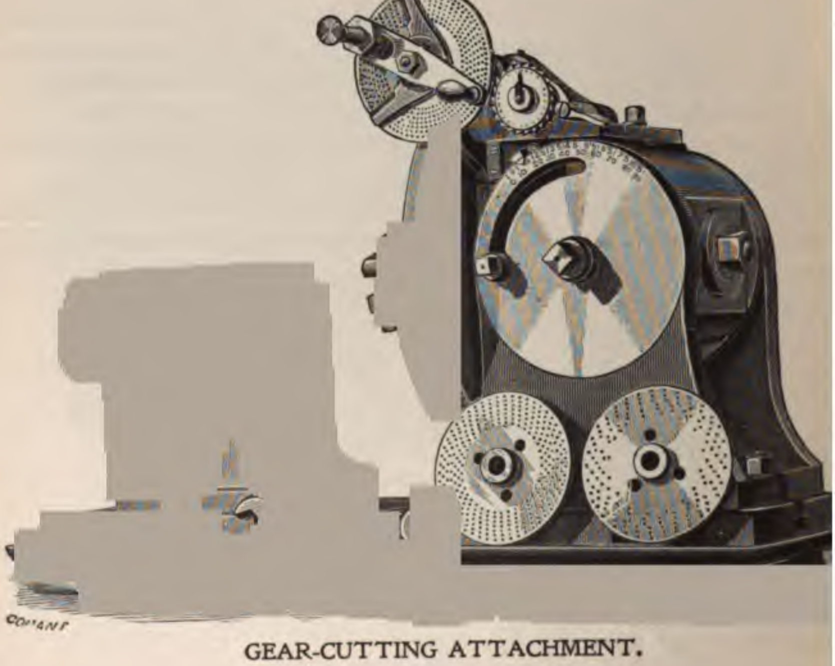
Code Word, Formicosi. Price $........................



HEAVY 10-INCH PLAIN CENTERS.



NEW COMBINATION HEAD.



GEAR-CUTTING ATTACHMENT.

HEAVY 10-INCH PLAIN CENTERS.

Made very heavy and strong, with a large dial, and provision for quickly clamping both centers. Dial is drilled in 13 circles, dividing all numbers to 26, all even numbers to 56, with several others to 120.

Code Word, Formkappe. Price, $ ....

NEW COMBINATION HEAD.

WITH PATENT BACK CENTER.

The plan of this Dividing Head is novel, combining the directness of a notched dial with the accuracy of a worm wheel of most approved construction. Two independent systems of indexing are combined in it; one for cutting gears or large milling cutters, the other for small work, or for finishing taps, reamers, nuts, bolt heads, etc. The most convenient tool ever used on a milling machine.

Swings 10 inches, has $\frac{13}{16}$-inch hole through center, and divides most numbers to 360 Front dial has 24 notches.

Code Word, Formkugel. Price, $ ....

GEAR CUTTING ATTACHMENT.

In this attachment the provisions for obviating all slack motion are very perfect. The worm shaft runs in compensating bearings, the steel worm has fine adjustments, the tool is capable of making divisions as fine as one minute of an arc, or dividing the circle accurately into 21,600 parts. These fine divisions, however, are merely incidental, the tool being designed with sole reference to general machine shop work.

The danger of mistakes in counting revolutions of the worm, which has heretofore been a drawback in the use of worms and worm wheels, for gear-cutting, is avoided in this tool by means of a Self-Registering Dial, which automatically registers each revolution of the worm. Upon touching a thumb lever, the dial returns at once to zero.

Five dials drilled in thirty-nine circles, make, in combination with the worm wheel, all divisions to 100, all even divisions to 200, with most of the other divisions except some prime numbers, to 360; also multiples of these numbers to 16,200. The dials are interchangeable, and additional dials, to make other required divisions, can be finished at trifling cost.

From the fact that the work can be supported upon or between two centers, that the tool is heavy and strong, and is without slack motion, gear wheels can be cut with unusual smoothness as well as accuracy, and a number of gears can be cut at the same time.

The automatic feed of the machine can be used for cutting.

The table on which the device is shown, represents a machine table, and is no part of the tool.

Price, with patent back center, $ ....

Code Word. Formosear

RULE FOR MAKING DIVISIONS IN THE "STYLE B" DIVIDING HEADS.

Make the number of teeth in the dividing wheel the numerator of a common fraction, number of teeth to be cut the denominator. Example: To cut 125 teeth, dividing wheel of 90 teeth, then $\frac{90}{125}$ is $\frac{18}{25}$ of the circle, therefore take 18 holes of a 25 hole circle.

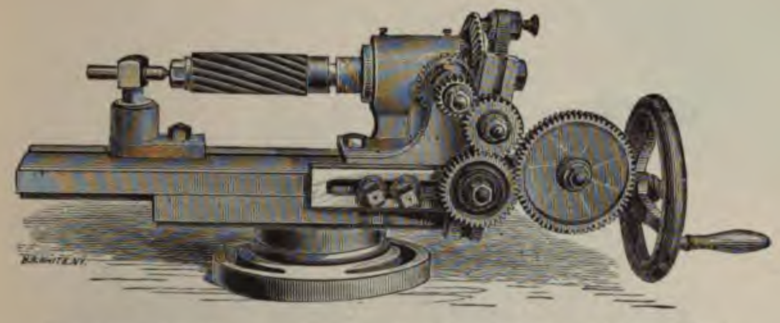
Where number of teeth to be cut is less than the number of teeth in the dividing wheel, then the whole number expresses the number of crank turns, and the fraction indicates the number of additional holes in the proper circles. Example: To cut a gear of 40 teeth where 90 is the number in the dividing wheel $\frac{90}{40} = 2\frac{10}{40} = 2\frac{1}{4}$, or two whole turns of the crank and $\frac{1}{4}$ of the holes of any circle divisible by 4.

It should be remembered that the range of divisions in a dial or set of dials, is limited to the possibility of finding common factors for the number of teeth in the dividing wheel, and the number to be divided. Therefore every prime number requires a circle containing its own number of holes in the dial, or if smaller, then a multiple of itself.

Should we wish for example to divide 419 with a dividing wheel containing 40 teeth it would be necessary to have a dial of 419 holes, and take 40 holes for each division. If 383 is to be divided a circle of 383 holes, still as before taking 40 holes for each division.

We append a table of prime numbers to 503:

2 3 5 7 11 13 17 19
23 29 31 37 41 43 47 53
59 61 67 71 73 79 83 89
97 101 103 107 109 113 127 131
137 139 149 151 157 163 167 173
179 181 191 193 197 199 211 223
227 229 233 239 241 251 257 263
269 271 277 281 283 293 307 311
313 317 331 337 347 349 353 359
367 373 379 383 389 397 401 409
419 421 431 433 439 443 449 457
461 463 467 479 487 491 499 503



HAND SPIRAL CUTTING ATTACHMENT.

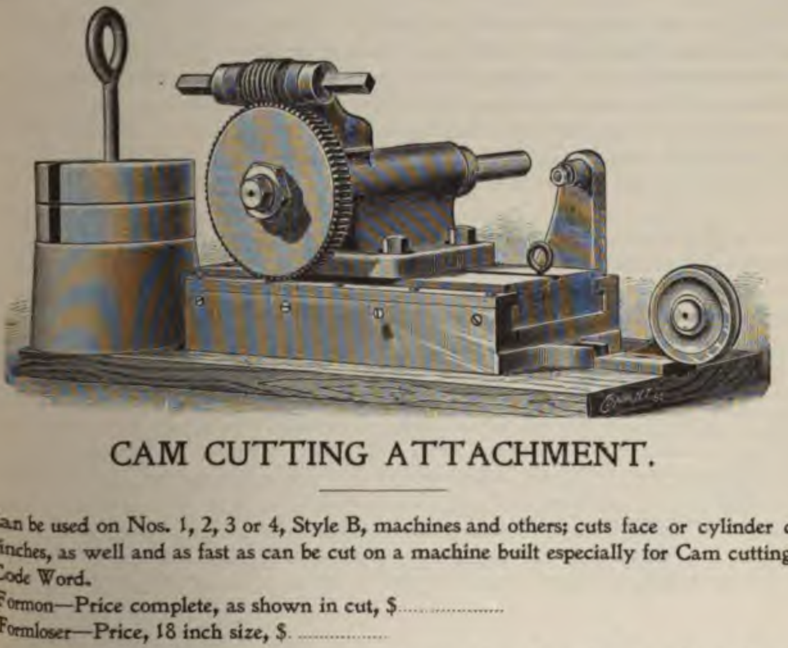
The cut shows one of three forms, and is that most commonly used. Being self-contained it is preferable to more complicated arrangements; is capable of cutting to 8 inches long and 8 inches diameter, right and left hand, and from 2 inches to 6 feet pitch. The four gears as shown, go with the tool, and give 12 different pitches, which are quite sufficient for all ordinary requirements. Other gears furnished if desired.

Code Word. Formola.

Price, $..............

The Automatic Spiral Cutting Attachment furnished whenever desired.

Price, $..............



CAM CUTTING ATTACHMENT.

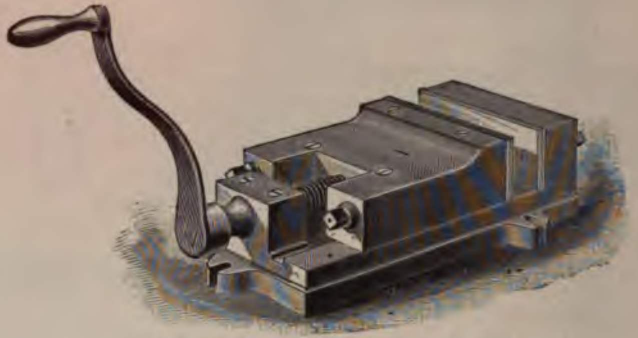
Can be used on Nos. 1, 2, 3 or 4, Style B, machines and others; cuts face or cylinder cams to 12 inches, as well and as fast as can be cut on a machine built especially for Cam cutting.

Code Word.

Formon—Price complete, as shown in cut, $..............

Formloser—Price, 18 inch size, $..............

In addition to the above attachments, a very complete line of centers is made for the "Style B" machines just described.



8-INCH IMPROVED FLAT VISE.

MILLING MACHINE VISE.

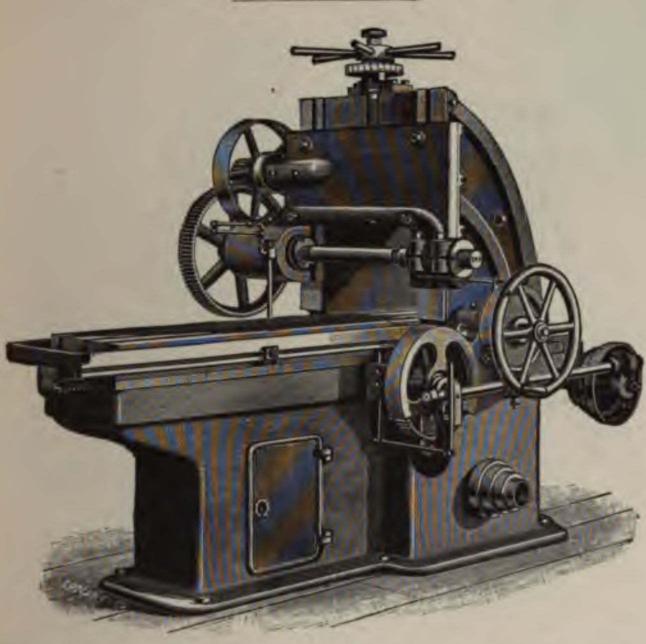
Rotary Vises are commonly used on the Universal Machines, and Flat Vises upon the Plain Machines. Flat Vises, however, can be used on Universal Machines when required, and 6, 7 and 8-inch flat vises are especially designed for such use, having ears on four sides, or segmentally slotted and tenoned to fit all the groves in work table. See cut above.

Prices include jaws of tool steel; if steel jaws are not wanted, a suitable discount is made. Jaws are jig drilled, and interchange with any vise of the same size.

The Vises with circular bases rotate through 360° and the base is graduated through 90° from zero in both directions.

SPECIFICATIONS.

Code Word	Size.	Width of Jaws.	Depth of Jaws.	Jaws Open.
Formulate	8" Flat, like cut	8¼"	3⅛"	5¼"
Formule	7" Extra heavy flat, like cut.	7⅛"	1⅞"	4¾"
Formulions	6" Improved flat, " "	6⅛"	1 11/16"	2⅞"
Formulista	7" Flat	7⅛"	1½"	2⅝"
Formvoll	6" Flat	6½"	1½"	2⅞"
Formylene	5" Flat	5⅛"	1 5/16"	2¼"
Formzacken	4½" Flat	4⅝"	1"	2¾"
Formiez	12" Circular base	12⅛"	2⅜"	9⅛"
Forminha	8" " "	8¼"	1⅝"	6"
Formionis	6" " "	6⅛"	1 7/16"	3¾"
Formique	5" " "	5⅛"	1⅞"	2¼"



HORIZONTAL SPINDLE MILLING MACHINE.

THIS MACHINE is intended for long and heavy cuts, such as guide bars, connecting rods, key seating shafting, axles to 10 inches diameter, etc., and is a very solid, substantial tool.

THE BED is heavy and well stiffened by a number of girts, making a firm support for the table and housings.

THE TABLE is 14 inches wide, has three T slots and is 8 feet long, moves by cut rack and so geared as to be easily operated by hand, and is surrounded by a trough to collect lubricant used on cutters.

THE CROSS HEAD is gibbed to the housings and adjusted by a screw with graduated dial reading to thousandths, which facilitates accurate measurement for sinking and other cuts. The distance between housings is 19 inches.

THE SPINDLE runs in bronze bearings 4⅜ inches diameter and 5½ inches long, is driven by a 3½-inch belt over a 20-inch pulley, through gearing in the ratio of 6 to 1, arranged for 3 speeds. Provision is made for horizontal adjustment of cutters, in addition to that afforded by washers. The greatest distance from top of table to centre of spindle is 20 inches; the least, 3 inches. Cutters to 8½ inches diameter can be used. Cutter section of spindle is 1¾ inches diameter, 14 inches long.

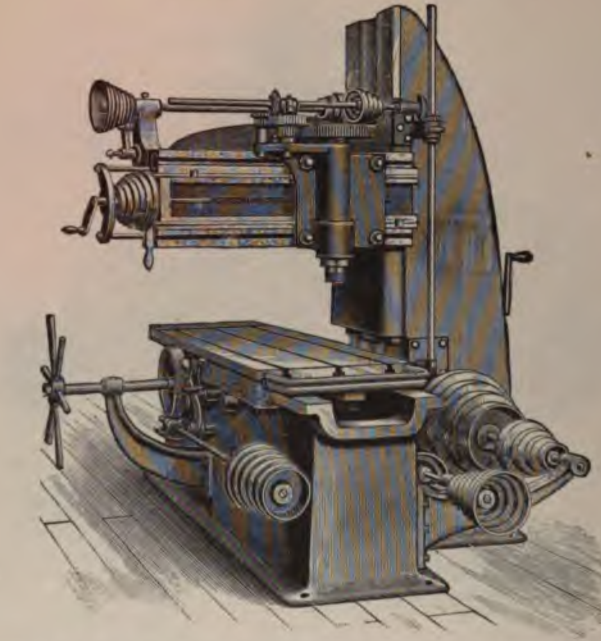
THE FEED is actuated by means of a worm and gear driven by cones having four sections, and can be thrown out by hand as desired or stopped automatically by adjustable stop, and is the full length of table. (Power elevating arrangement for cross-head can be furnished.)

A PUMP returns the lubricant to the cutters as collected in a tank contained in the bed.

COUNTERSHAFT has tight and loose pulleys 18 inches diameter for 4½-inch belt, and should run 200 turns per minute.

Weight, 8000 lbs. Price, $ ....

Code Word. Formosinho.



VERTICAL SPINDLE MILLING MACHINE.

THIS MACHINE is designed for surface milling, using face or end cutters from 1 inch to 12 inches diameter.

THE BED is heavy and well stiffened with girts and calculated to absorb all vibrations.

THE UPRIGHT is firmly attached to the bed, is of box pattern 8 feet high, 24 inches wide, and so constructed as to best withstand torsional strains and vibrations.

TABLE is 24 inches wide, 96 inches long. Pans project from each end to protect bearing on bed which are flat and to which it is firmly gibbed. There are three T slots running its entire length.

CROSS HEAD has a bearing on upright of 24 inches wide, 48 inches long, and is well braced to resist action of cutter. It is adjusted by means of a screw geared down to a hand crank provided with graduated dial reading $\frac{1}{1000}$ inches.

SADDLE which carries the spindle is securely gibbed to the cross head on which it has a movement of 24 inches at right angles to that of the table.

SPINDLE HEAD has 6 inches independent vertical adjustment in saddle.

SPINDLE is of hammered steel and runs in hard bronze boxes, the lower one is conical, 4 inches diameter, 5 inches long. It is driven by a 3½-inch belt on a 4 section cone through gearing in the ratio of 6⅔ to 1, with compound 16½ to 1, calculated to give proper speeds for cutters ranging from 1 inch to 12 inches diameter.

FEED is by hand or power the full length of table, and is provided with automatic stop. There are six changes from 1 inch to 8 inches per minute, regardless of diameter of cutter.

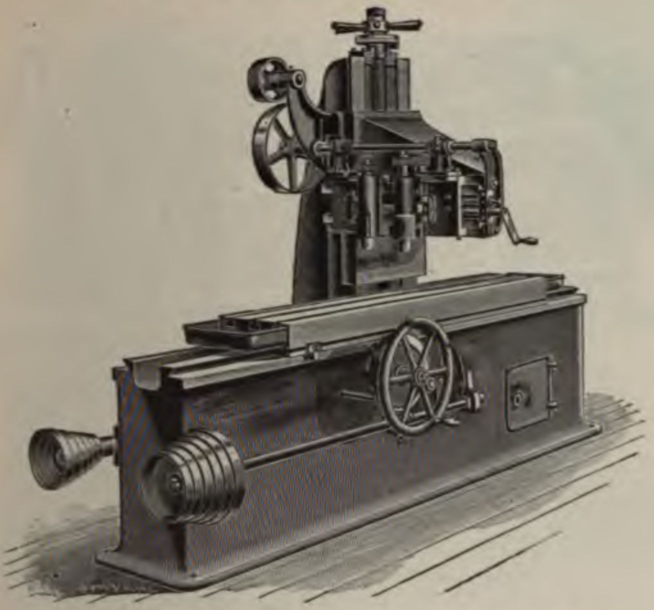
COUNTERSHAFT has tight and loose pulleys 16 inches diameter for 4½-inch belt, and should run 340 turns per minute.

Weight, about 17,000 lbs.

Price, $..................

Code Word. Formosorum.

Illustration shows power cross-feed: Machine without it can be furnished.



VERTICAL TWO SPINDLE MILLING MACHINE.

THIS MACHINE consists of a box bed 9 feet long with extension on back supporting the upright which carries the overhanging arm to which is fitted the two saddles carrying the spindles.

THE SPINDLES, as illustrated, are made with 1½-inch diameter conical bearing at lower end and 1½-inch straight bearing at upper end, each provided with bronze bushings. The spindle ends extend 2 inches below spindle head. The cross adjustment of spindle centres is from 2½ inches to 14 inches. Each spindle is provided with ½-inch independent vertical adjustment. The vertical adjustment of cross head on upright is by means of a screw, and is provided with a dial to read to thousandths of an inch. The spindles can be raised from platen to 17½-inches above.

THE BELT which drives the spindles, also drives the feed mechanism and is so arranged that the tension of driving belt is not altered by the vertical movement of cross head on upright.

SPECIFICATIONS.

PLATEN is 6 feet long on work surface, 14 inches wide and 5 inches deep.

FEED is 6 feet 4 inches by hand or power, provided with automatic stop, and has twelve changes from 1 inch to 16 inches per minute at same speeds, but 2 inches to 8½ inches per minute at any of the spindle speeds in either direction.

SPINDLES have No. 3 Morse taper holes.

UPRIGHT is 18 inches wide on face.

PULLEY on driving shaft of machine is 16 inches diameter for 3-inch belt.

CROSS HEAD adjustment on upright moves spindles from 0 to 17½ inches above platen.

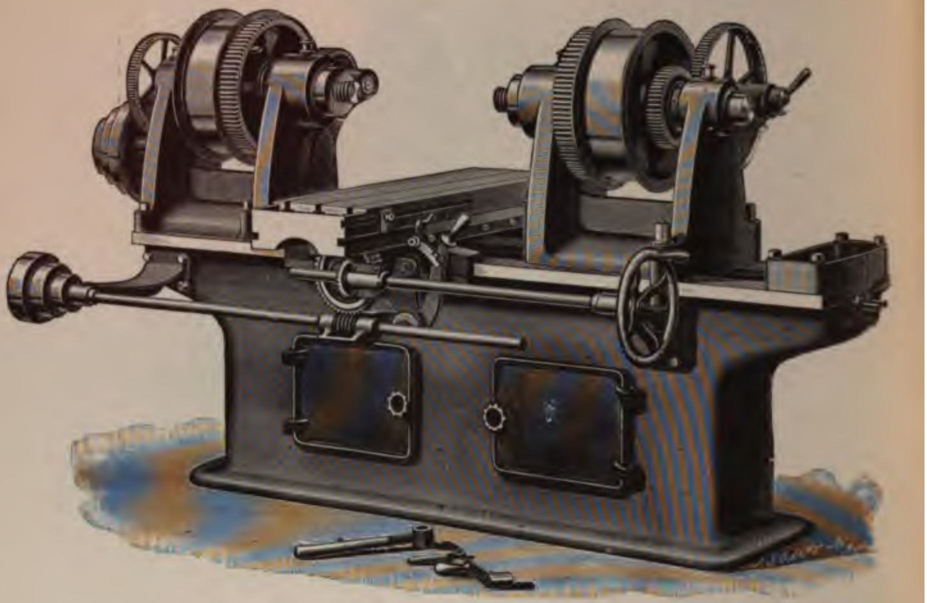
There are two countershafts. The first to run 210 R. P. M.

EXTREME HEIGHT of machine, 7 feet.

WEIGHT, about 8,000 lbs.

Price, $......................

Code Word. Formosulos.



No. 1 DUPLEX MILLING MACHINE.

THIS MACHINE is designed for manufacturing purposes, taking cuts on one side of two pieces, or on two sides of one piece at the same time, the article passing between the ends of the spindles and the work done by face mills, which produce the best results when the nature of the work will admit of their use. Milling Cutters of this character are the most economical to construct and maintain.

THE BED is 8 feet long, 18 inches wide, 27 inches deep, and very heavy.

HEADS—There are two heads, one fixed, the other can be moved horizontally by means of a screw, to any desired position on the bed, and securely fastened.

THE SPINDLES run in bronze boxes; the front bearing is 4⅞ inches diameter, 6 inches long, back bearing 3⅜ inches diameter, 5 inches long. The greatest distance from end to end of spindles is 3 feet, least distance, 5 inches. The driving pulleys are 16 inches diameter for 5-inch belt. The back gearing is in the ratio of 8 : 1

THE CARRIAGE is moved on the bed by a screw to the desired position, and then fastened.

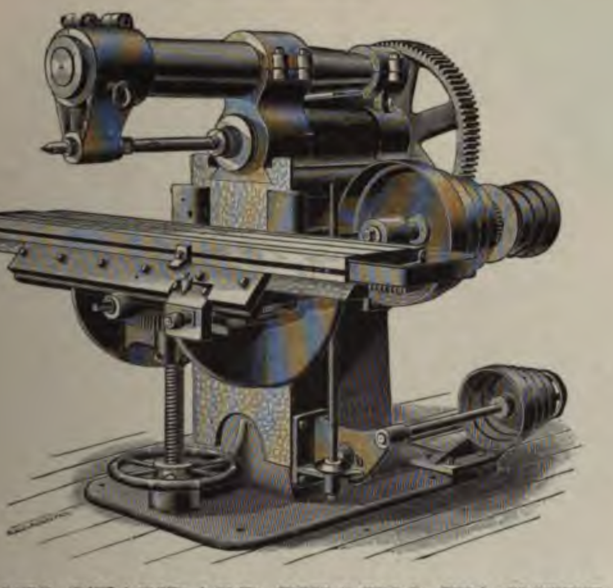
THE TABLE has no vertical adjustment, the article to be operated upon being held in a suitable fixture. The top has three T slots, and is 40 inches long, 14 inches wide, and has an automatic screw feed of 30 inches. The distance from centre of spindles to top of table is 10 inches.

FEED is automatic by a screw, and is 30 inches, the rate is by change gears and cones, 1, 2, 3, 4, 6, 8, 10 and 12 inches per minute.

COUNTERSHAFTS—There are two countershafts, each having a three-section cone, giving six properly arranged speeds to the spindles. The first shaft has tight and loose pulleys 16 inches in diameter for a 6-inch belt, and should run about 120 turns per minute.

Weight, including two countershafts, 7,500 lbs. Price, $..................

Code Word. Formosulum.



HEAVY STANDARD MILLING MACHINE.

THIS MACHINE is intended for general machine shop use, but on larger work requiring larger cutters and taking deeper cuts than usually attempted on milling machines of its type.

THE HEAD is 32 inches long, has a horizontal movement of 3 inches on top of standard for the cross adjustment of cutters, thus dispensing with one joint below the table, and has an overhanging arm 8 inches diameter which is removed for the use of cutters over 12 inches diameter.

THE SPINDLE is of steel and runs in bronze boxes. The front bearing is conical 6½ inches diameter. Has threaded end for face cutters and taper hole for cutter arbors. It is driven by a cone with four sections; the largest 20 inches diameter for a 3½-inch belt through a gearing in the ratio of 16 to 1. The spindle gear is 30 inches in diameter, 3½-inche face.

THE TABLE is 14 inches wide, 72 inches long. At the lowest position the top is 24 inches below the center of the spindle. It has a bearing in the knee 14 inches wide, 48 inches long.

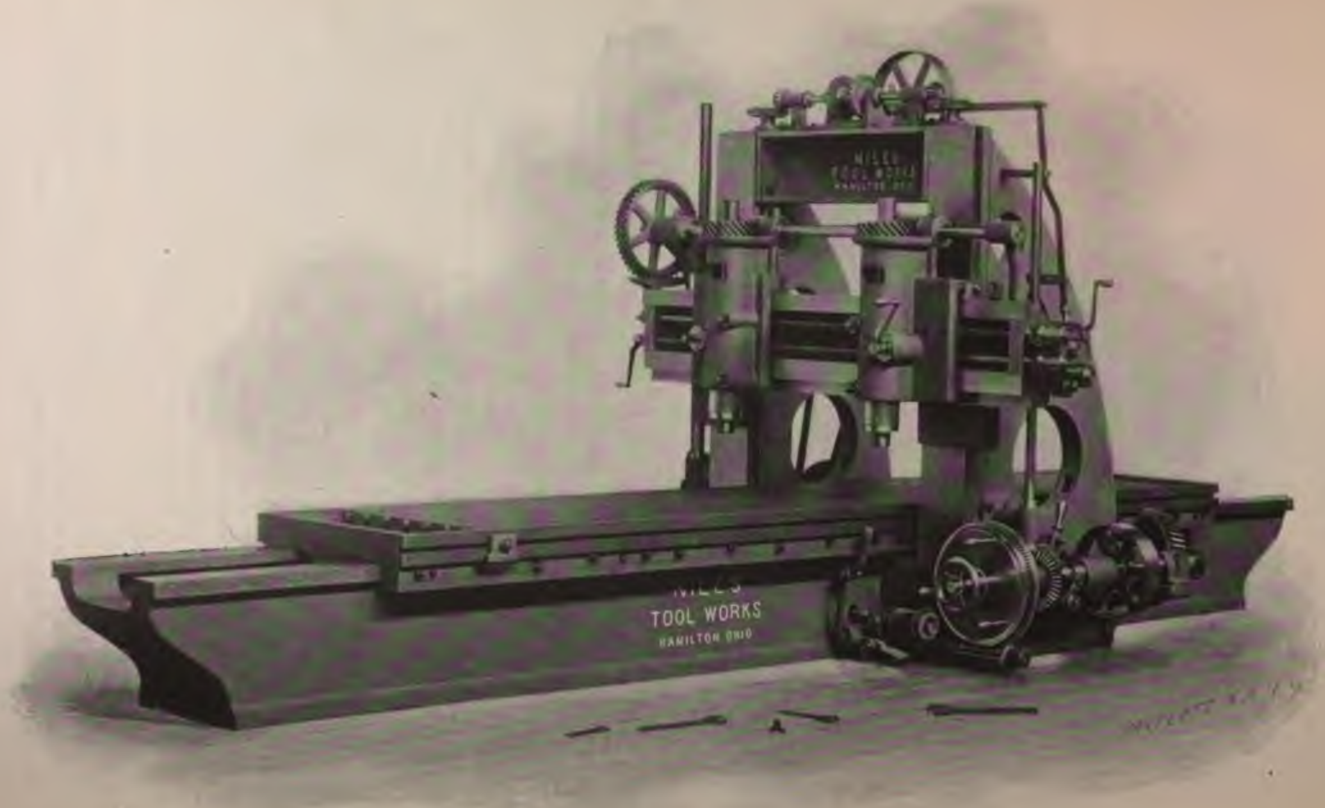
THE KNEE has bearing on standard 20 inches wide, 26 inches long, is supported by elevating screw 2½ inch diameter. The hand wheel nut rests on hardened steel balls.

THE FEED is the full length of the table and driven by a 2½ inch belt on a four section cone and in connection with intermediate gearing, twenty changes of feed can be obtained so that the maximum rate of feed per minute of the table can be maintained irrespective of the diameter of cutter used and proportionate spindle speed. This is a very desirable feature as it is frequently required that the rate of feed per minute of the table should be greater when using a cutter of large diameter, and consequently slow spindle speed than when using a cutter of small diameter and fast spindle speed.

THE COUNTERSHAFT has tight and loose pulleys 16 inches and 20 inches diameter, and should run 250 and 90 turns per minute respectively. Floor space required 80 inches by 160 inches. The base is 36 inches by 54 inches. Height is 67 inches. Center of spindle 50 inches above floor.

Code Word, Formosura. Price, $.................... Weight, 8000 lbs.

EXTRA ATTACHMENTS. An automatic vertical feed for knee can be furnished, also a Vertical Spindle Milling Attachment.



36-INCH VERTICAL MILLING MACHINE.

VERTICAL MILLING MACHINE.

MASSIVE; SUBSTANTIAL; CONVENIENT.

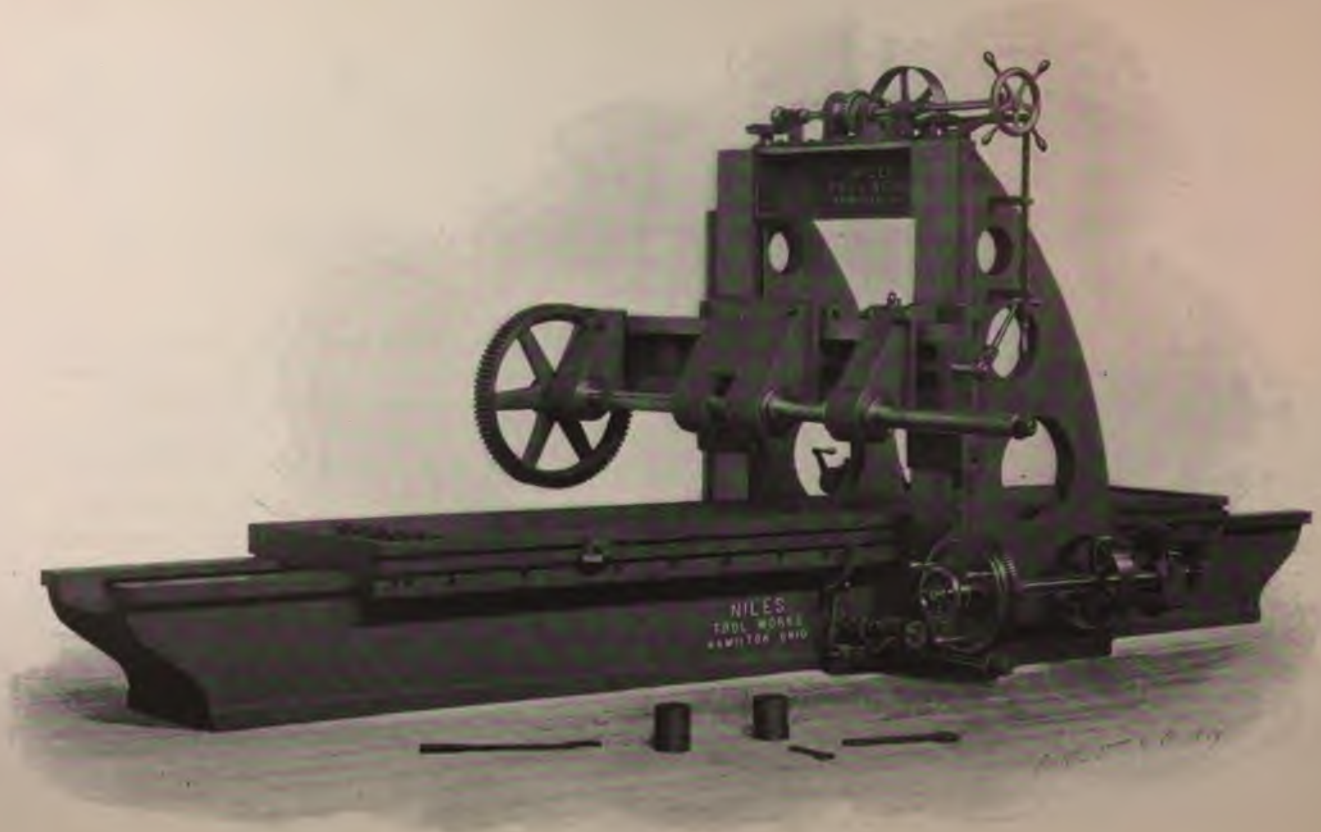
In designing these machines much attention was given to, and provision made for, the strength and power of parts so necessary for successful milling.

The housings are double webbed; cross-rails are box-girder form and raised and lowered by power The beds are extra long to prevent any undue overhang of the table when at the extreme end of the stroke, and are strongly cross girted. The tables are very heavily webbed; are square gibbed to the beds; run on large, flat ways; provided with water channels around the edges to catch the lubricant that may be used on the work during the heavy milling; are driven by spiral gearing; arranged for throwing out feed automatically for any length of work desired, and can be moved quickly by independent countershaft for adjustment of table in either direction. The table power feed can also be thrown out and operated by hand.

The cross feed to the saddles is thrown out and operated by hand or automatically, as may be desired. They are also provided with quick hand adjustment, both cross and vertical, and the two spindles are driven by spiral gears, thus insuring smoothness of motion. The cross feed of the spindles is reversible by slip gears at the end of the cross rail.

TABLE OF SIZES.

Code Word	Size.	Length.	Countershaft Pulleys.				Weight.	Price.	Weight Per Foot.	Price Per Foot.
			Diam.	Face.	Width of Belt.	Rev.				
Microgram ..	26x26"	8'	20"	5"	4½"	200	....	$	....	$ ....
Micrograph...	36x36"	12'	20"	5"	4½"	300	....	$	....	$ ....
Microhn	48x36"	12'	20"	5"	4½"	300	....	$	....	$ ....
Microlepes....	50x36"	12'	20"	5"	4½"	300	....	$	....	$ ....
Microlicia.....	60x48"	12'	20"	5"	4½"	300	....	$	....	$ ....



36-INCH HORIZONTAL MILLING MACHINE.

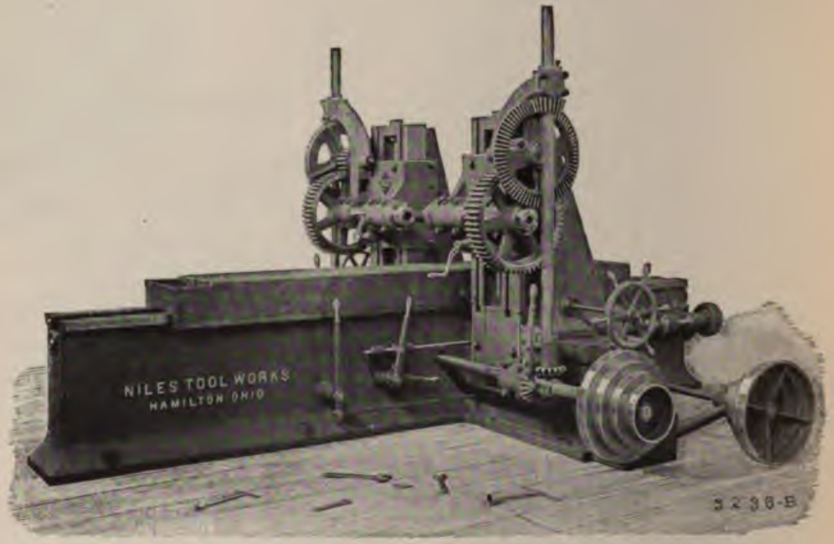
HORIZONTAL MILLING MACHINES.

For slab milling the output from these machines cannot be equalled by tools of any other type.

The general description given for Vertical Milling Machines, on page 223, applies to these machines as well, except that with this type machines are provided with hand movement for close adjustment of cross-rail.

TABLE OF SIZES.

Code Word.	Size.	Length.	Countershaft Pulleys.				Weight.	Price.	Weight Per Foot.	Price Per Foot.
			Diam.	Face.	Width of Belt.	Rev.				
Microcebe.....	26x26″	8′	20″	5″	4½″	200	....	$	....	$ ....
Microchloe ...	36x36″	12′	20″	5″	4½″	300	....	$	....	$ ....
Microciona ...	48x36″	12′	20″	5″	4½″	300	....	$	....	$ ....
Micrgocline.	50x36″	12′	20″	5″	4½″	300	. ...	$	....	$ ....
Microcone	60x48″	12′	20″	5″	4½″	300	....	$	....	$ ....



HORIZONTAL DUPLEX MILLING MACHINE.

This is a most excellent tool for engine and pump builders, as well as for general shop use. It will turn out work suited to it much more rapidly than a planer.

The cutter spindles are hammered steel forgings, and have ample bearings in bronze boxes. The noses of spindles have taper sockets, are hollow throughout, and have threads and collars for large cutters.

The saddles are easily adjustable vertically by hand, have ball-bearings on the elevating screws, and have wide bearings on inner faces of column as well as in front. They are clamped into position by T-head bolts and well gibbed to take up wear.

The columns are movable on bed by screws and hand wheels, well gibbed and provided with clamp bolts.

The driving gear is strong enough to take the full belt pull on one head, and the power is sufficient for two good cuts. Either head may be thrown into gear without the other.

Bed is very deep and of ample length to give good support to the table.

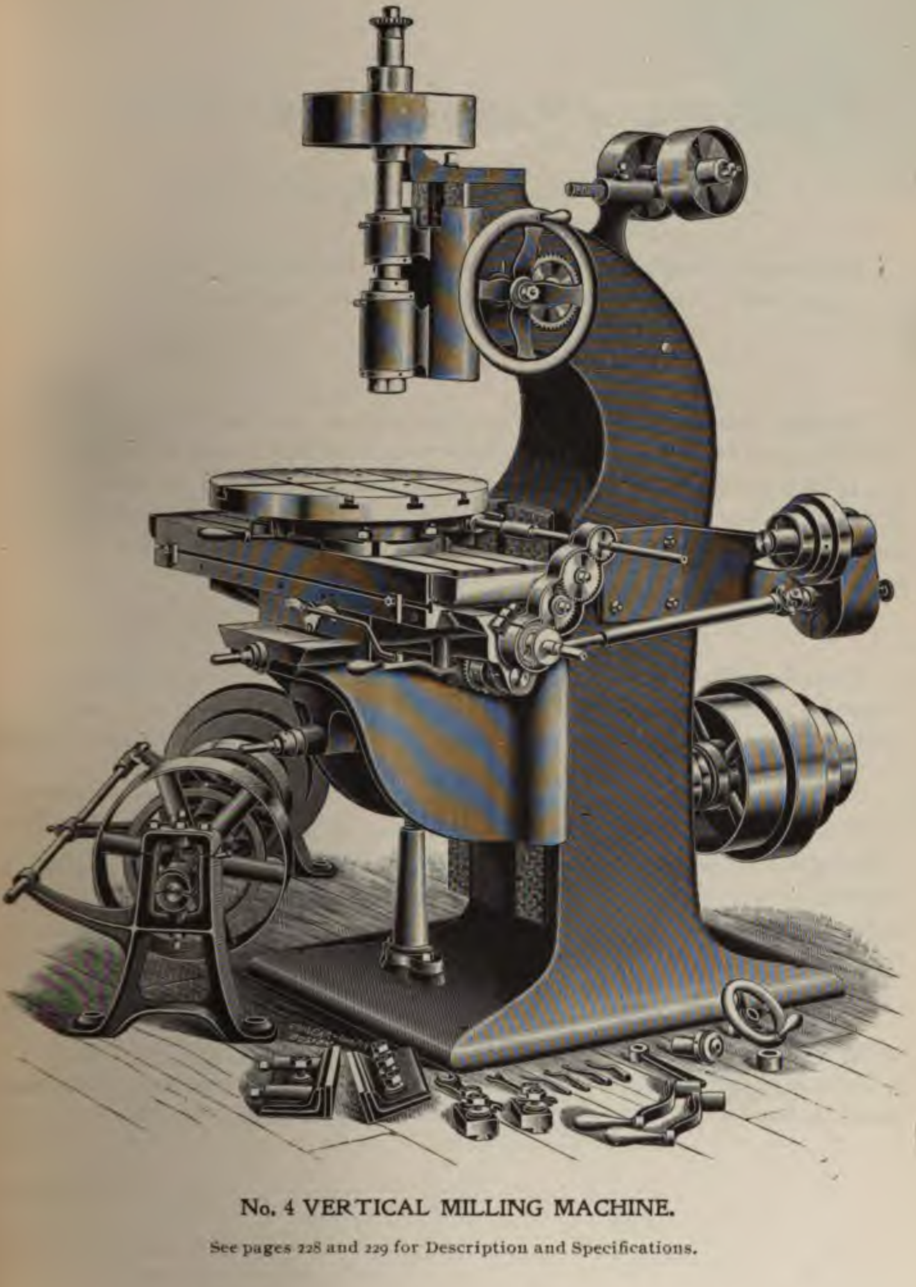
There are 8 feeds ranging from 1/16-inch to 1/3-inch per revolution of spindle, by 4-step cones and two changes of gear.

Center of spindles range from 1½ to 20 inches above table. Faces of cutters from 3 inches to 24 inches apart.

Tables have reversible feeds, quick traverse in both directions by power, also hand adjustment from both sides. The cone has 3 steps for 4½-inch belt.

Countershaft has 2 sets of pulleys, one set 32 inches diameter, 5½ inches face, runs 160 revolutions, and one set 26 inches diameter, 5½ inches face and runs 300 revolutions.

Code word, Microdon. Weight, ... Price, ...



No. 4 VERTICAL MILLING MACHINE.

See pages 228 and 229 for Description and Specifications.

VERTICAL SPINDLE MILLING MACHINES.

No. 1

This machine is designed to perform the most delicate kind of milling upon steel, brass, copper, zinc and wood. It is particularly well suited to the stamp engraver for whom it was originally built.

No. 2.

Embodies features on which patents have been granted. Consisting of all auxiliary anti-friction bearing, adjustably mounted with relation to the usual fixed bearing, so that the spindle may be freely rotated without being drawn against its stationary bearing by the one-sided action of the belt. The results thus obtained are viz. Reduction of friction upon the spindle bearing, constant alignment of spindle with relation to platen, High spindle speed without overheating bearings.

No. 3.

Is an extremely useful and handy shop tool, aside from its superior quality as a die-sinker. It embodies same valuable features embodied in the No. 2 miller, consisting of the adjustable auxiliary anti-friction bearing.

No. 4.

This machine has been entirely remodelled, table feeds are positive, the frame has been very much stiffened, the knee is larger and heavier. Feeds can be instantly reversed from front of machine, and in numerous other respects no expense has been spared to make this machine as perfect as possible.

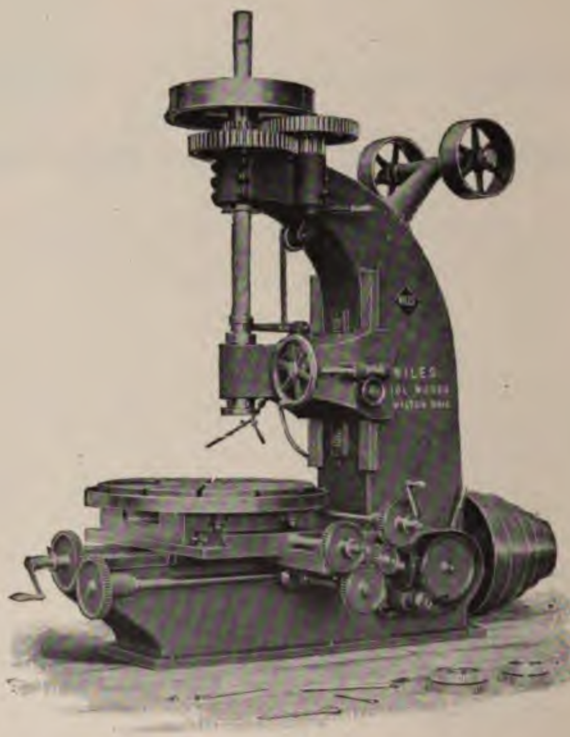
No. 5. BACK-GEARED

That the Vertical Spindle Machine is more practical, more labor-saving and of much greater utility than the common horizontal spindle machine is an established fact. The No. 5, as illustrated on opposite page, embodies the latest improvements, the spindle is powerfully back-geared, the frame is very heavy and rigid, capable of sustaining heavy cuts without vibration.

VERTICAL SPINDLE MILLING MACHINES.

SPECIFICATIONS.

	Hand Millers.		Automatic Feeds.		
No. of Machine.	1	2	3	4	5
Size of platen	15''x8''	17''x9''	27''x10''	36''x10''	48''x13''
Longitudinal feed	12''	15''	21½''	28''	40''
Cross feed	10''	12''	12'' hand	13'' hand	13'' automatic
Vertical feed of spindle	2''	3''	4'' hand	5'' hand	7'' automatic
Greatest distance between spindle and platen	8½''	17½''	18 1/16''	20¼''	20½''
Distance betweed Cen. of spindle and neck	9''	16''	16''	16''	17''
Diameter of spindle main bearing	⅞''	1''	1½''	2⅛''	3''
Diam. of spindle driver	2'' & 5''	2'', 5'' & 8''	10''	12''	15''
Range of spindle speeds	200 to 10.000	200 to 10.000	100 to 2.000	50 to 1.500	10 to 800
Size of hole in spindle	7/16'' for collets	19/32'' for collets	⅞'' for collets	B. & S. taper No 10	B. & S. taper No. 11
Diam. of rotary table	13''	15''	18'' hand	20'' automatic	22'' automatic
Net weight	750	1300	1800	2700	4100
Boxed	810	1550	2100	3200	4500
Cubic feet	45	60	80	100	125
Price Complete	$	$	$	$	$
Code word complete	Fornello	Fornice	Fornitura	Fornorum	Fornuolo
Price without rotary	$	$	$	$	$
Code word, without rotary	Forosella	Forosetto	Forpaitre	Forpassed	Forpine
Countershafts	Tight & Loose Pulleys 6'' diam.	Friction Pulleys 8'' & 12'' dia.	Friction pulleys 8'' & 12'' diam.	Friction Pulleys 10'' & 14'' diam.	Friction Pulleys 12'' & 18'' diam
Width of belt	2¼'' Belt.	2½'' Belt.	3'' Belt.	4'' Belt.	4½'' Belt.
Speed of c'n't'rshaft Revs. per min Fast	400 to	700	400	400	400
Slow	700	125	100	100	100



No. 6 VERTICAL MILLING MACHINE.

An economical and labor-saving machine in any shop; will be found especially so by locomotive, engine and pump manufacturers.

The spindle is driven directly by belt for fast speeds: back-geared for heavy work; has vertical adjustment; lower bearing also adjustable by worm gear and is counterweighted.

The same weight holds the spindle up against the collar and avoids jumping of the cutter.

Table has five feeds for each spindle speed, positively driven by change gears and reversible by a convenient lever. Worm wheel is large to give good support to table, and worm can be thrown out, allowing the table to be quickly revolved by hand.

Maximum distance from table to end of spindle, 26 inches.

Distance from center of spindle to column, 24 inches.

Diameter of circular table (finished surface), 42 inches.

Longitudinal traverse of table, 20 inches.

Transverse traverse of table, 32 inches.

Driving cone has four steps for 4½-inch double belt.

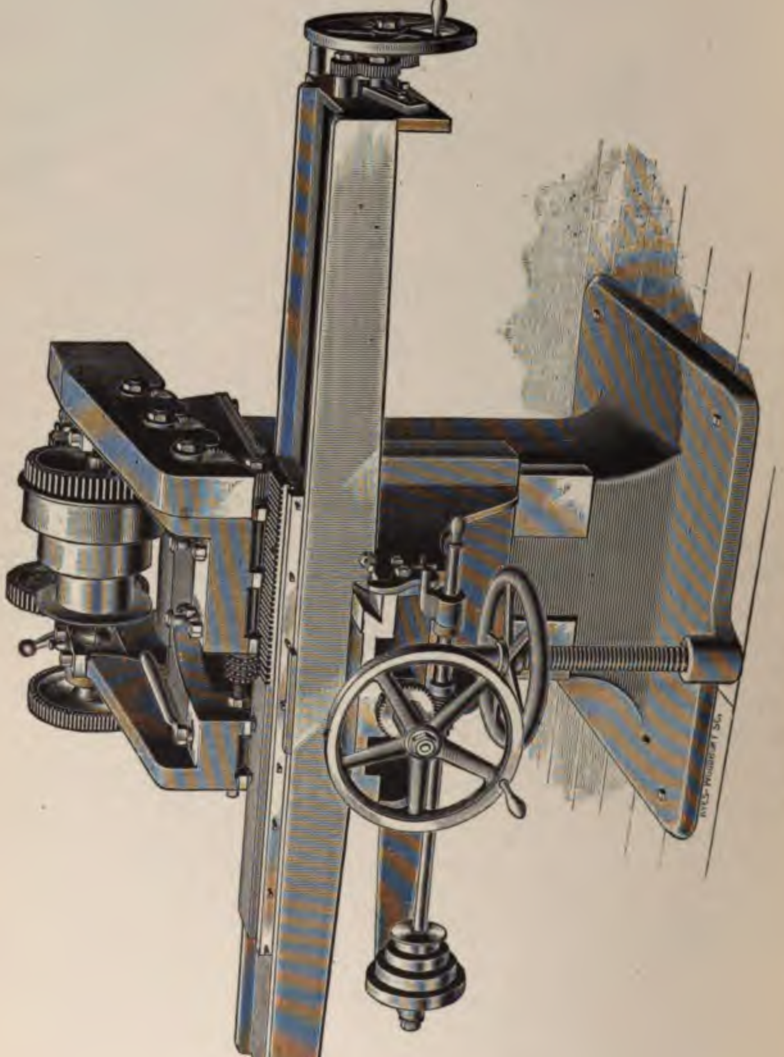
The feeds are cross, longitudinal and circular, operated from either the front or the side of the machine.

Countershaft pulleys are 24 inches diameter, 5 inches face, for 4½-inch belt. Speeds, 55 and 110 revolutions per minute.

Code word, Micromega. Weight, ... Price, $..................

PART XV.

RACK AND GEAR CUTTING MACHINES.



SEMI-AUTOMATIC RACK CUTTING MACHINE.

SEMI-AUTOMATIC RACK CUTTING MACHINE.

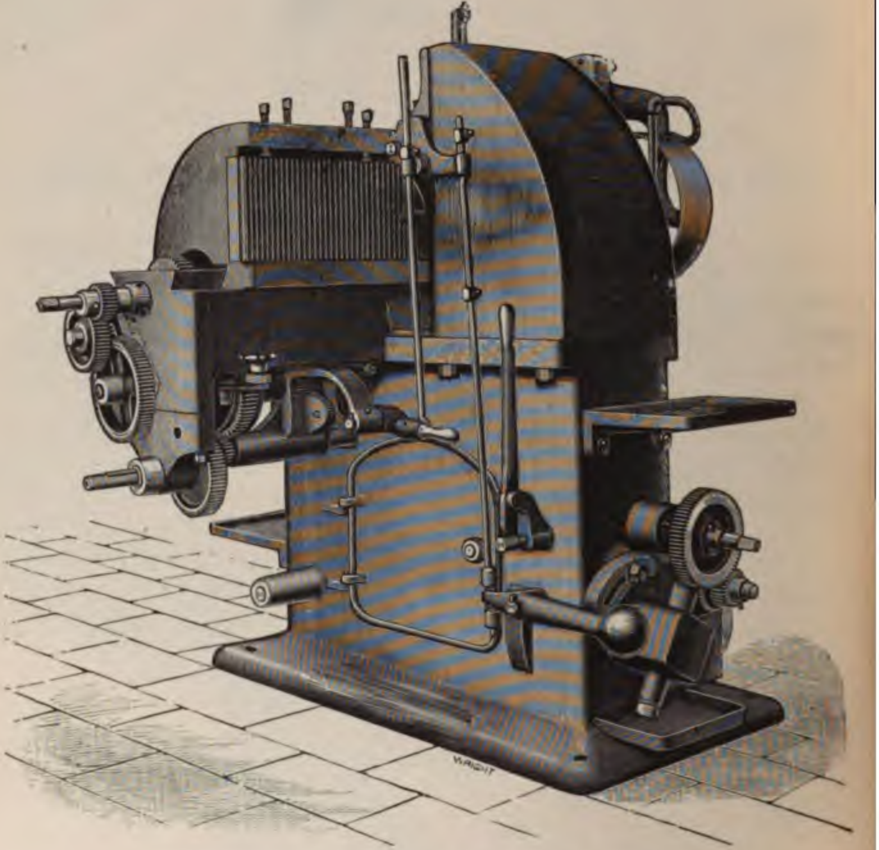
This machine is designed to meet a want where the purchaser does not wish to invest a large amount of money, but at the same time requires a good strong tool.

In this he has a machine combining both strength and accuracy, with simplicity of movement.

The driving head is back-geared, and the cone has 3 steps for a 3-inch belt; largest diameter of cone is 9 inches; spindle is made of hammered steel; front bearing is 2 inches diameter by 4 inches long; cutter bar is driven by gears and will receive two or more cutters, which block out and finish the teeth at the same time; table is operated by means of a screw running through centre of bed, which is connected with index at the end of machine. It will cut racks of any length and at one setting will cut 32 inches in length by 7½ inches face.

Table has a vertical movement of 10 inches. The machine can be made to cut any pitch rack required by simply changing gears at end of machine.

Code Word, Forquilha. Weight, 2600 lbs. .... Price, $ ....



ENTIRELY AUTOMATIC RACK CUTTER.

Cut Represents 3-Foot Machine.

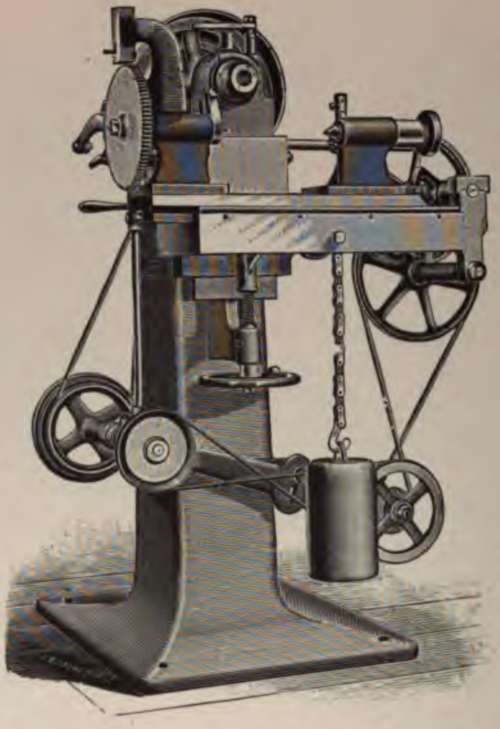
ENTIRELY AUTOMATIC RACK CUTTER.

With this machine racks are cut entirely automatically. The blanks are held in a vertical position and consequently the slide travels vertically. With this "up and down" movement, the chips or cuttings never obstruct the travel of the cutter carriage. It also aids in directing and controlling the flow of lubricants.

The Gang Cutters, which are used on these machines, have their points set spirally and thus avoid the chatter and rapid dulling of the edges. Racks of any length can be cut and the machines will stand work as coarse as two inch circular pitch and carry from one to twelve cutters at one time, according to the pitch.

SPECIFICATIONS.

Code Word.	Will cut at one setting.		Countershaft.			Weight.	Price.
	Length.	Face.	Diam. T&L Pulleys.	Face.	Revs.		
Forrabas	3'	8"	14"	4"	275	5000 lbs.	$................
Forragem	6'	8"	14"	4"	275	6000 lbs.	$........ ......
Forraran.......	6'	10"	16"	6"	170	10000 lbs.	$....... ....
Forrays	10'	10"	16"	6"	170	12000 lbs.	$....... ....



AUTOMATIC PINION OR GEAR CUTTER.

AUTOMATIC PINION OR GEAR CUTTER.

This machine as regularly made will cut gears, indexing and feeding automatically with any number of teeth from 8 to 180 teeth. Proper index plate to be provided. It will handle 6-pitch cutters, and finer. Under a cutter 2¼-inch diameter, blanks of 7-inch diameter and face not exceeding 3½ inches can be cut. On regular work the machine can be run ten hours, with not to exceed a half hour's attendance.

The spindle is 2¼ inches diameter in front bearing, and runs in bronze boxes provided with means of compensation for wear. In front end of spindle is taper hole to receive arbor. A small hole extends entire length of spindle, in which is placed rod and threaded bolt to force arbors out. Either end of the front box is threaded, and by collars in front of, and in rear of main bearing, an end adjustment of ⅜ inch secured.

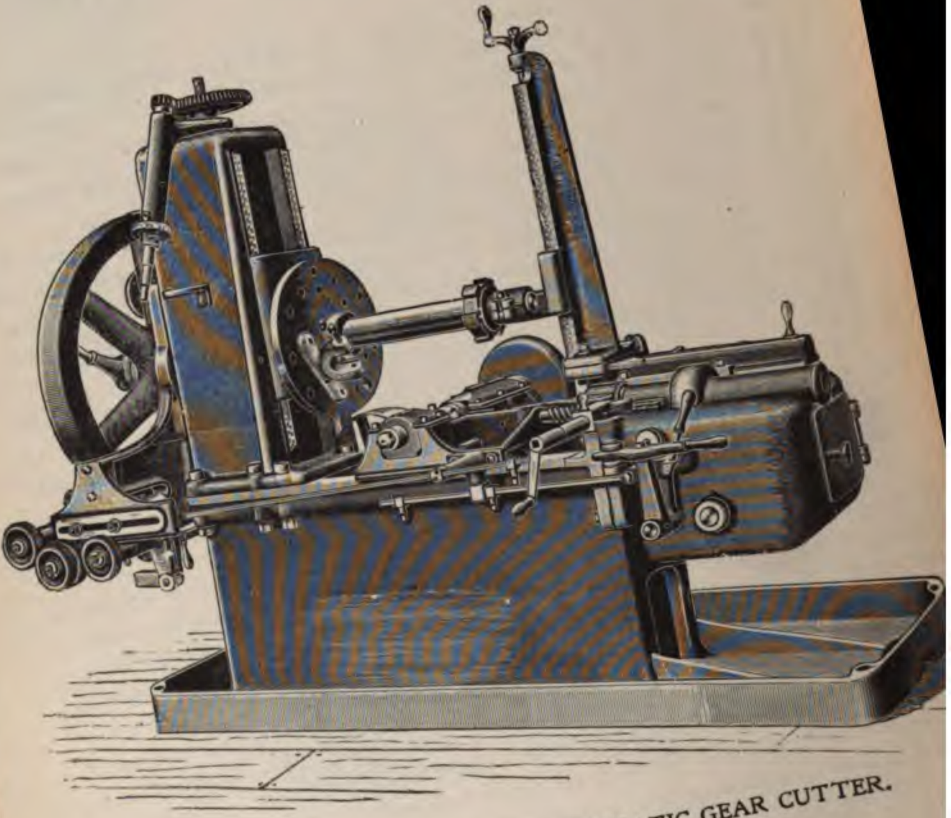
The table is 19½ inches long, 5 inches wide. Distance from center to top of table 4¼ inches.

The feed of table against the cutter is by means of a cam. These can be furnished with from 1 inch to 4½ inch throw. The table is held against the cam by means of weight shown. The feed is driven by a three-step cone pulley on main spindle. For extra range of feed the two pulleys on swing-arm can be transposed.

There is regularly with machine one index plate, with 120 teeth. Provision is made for using this or any other plate for cutting any number of teeth that will divide into the number of teeth on plate. We recommend special indexes, with exact number of teeth required, where a large amount of same style of work is to be done. Separate index furnished. Cost of blank, $2.50, cutting teeth extra.

With each machine is furnished three cams—2, 3, and 4½ inch throw; also, countershaft, with three-step cone—6, 8, and 10-inch diameter. Tight and loose pulleys, 12-inch diameter, 2½ inch face. Speed for iron and steel, 110 revolutions per minute. If used to cut brass gears the counter should run 500 to 600 turns and smaller tight and loose pulleys are recommended. When both brass and steel are to be cut a special counter with two pairs of tight and loose pulleys can be furnished.

Code Word, Forraseis.
Shipping weight, 750 lbs.
Price of machine, with plain counter, $ ....



NEW TYPE" ENTIRELY AUTOMATIC GEAR CUTTER.

For Cutting Spur Gears Only.

following may be mentioned: **Special gear drives are used on the cutter spindle and** wherever they increase the even running qualities of the machine.

Changes of feed are made with gearing. The crank handle used for feeding the cutter slide disconnects automatically and remains stationary when unemployed.

The Cutter Slide cannot feed forward if the divisions have not been fully completed.

The return of the cutter carriage is quick and uniform; changing the feed does not change the speed of the return.

The worm dividing wheel is made in sections by a new process which eliminates any possibility of error, and makes a practically perfect wheel.

An index and proper chain wheel accompany the machine for cutting all gears from 10 to 100 teeth, all but prime numbers up to 200 and a great many larger numbers.

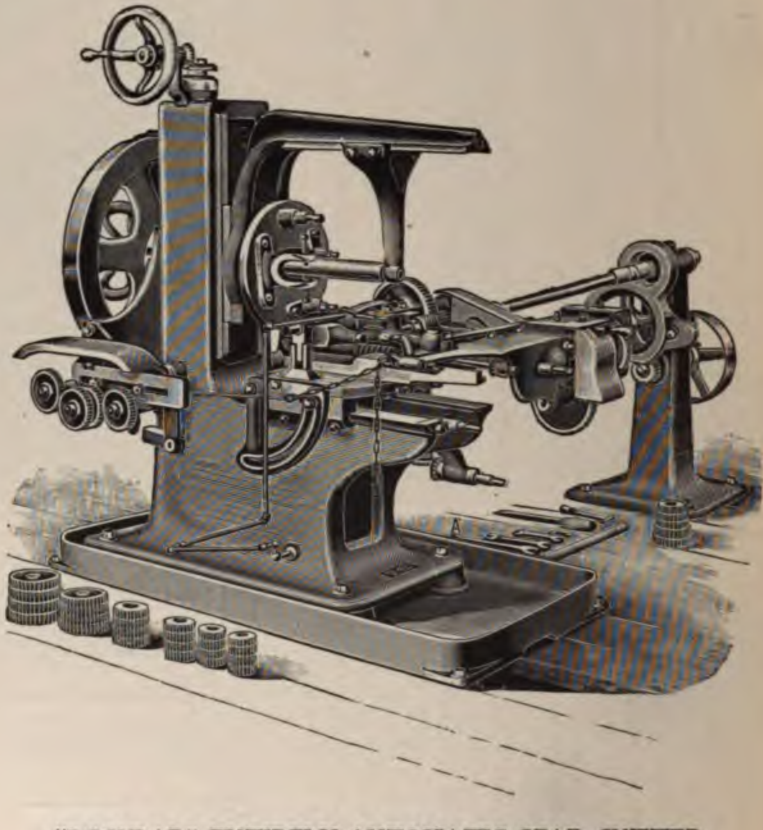
All bearings are lubricated automatically. A pan is cast around the base of the machine for holding a lubricant, and a pump is furnished for supplying the lubricant to the cutter automatically. The pan catches all drippings from machine.

Outside support to the gear mandrel rests on the feed casing of the machine. An adjustable rim support to take the strain of the cutter when cutting large wheels is also furnished.

The cuttings are removed from under the cutter automatically. Power raising and lowering device to head is furnished with the 48-inch by 12-inch, and larger machines.

SPECIFICATIONS.

Code Word.	Capacity Will Cut		Pitch Diametral.	Diam. of Cutter Arbor.	Class of Work.	Countershafts.			Boxed Weight.
	Diam.	Width Face.				Diam. Pulleys.	Width Face.	Rev.	
Forschen......	28''	9''	4	1¼''	Medium	12''	3¼''	180	3600
Forschung....	36''	10''	3	1¼''	"	14''	4½''	240	5400
Forsenno......	48''	12''	2	1½''-2''	"	16''	6½''	200	7800
Forsoothed..	60''	12''	2	1½''-2''	"	15''	6½''	200	8400
Forspoken...	64''	16''	1½	1½''-2''	Med. & Heavy	20''	6½''	240	10000
Forstgraf......	72''	16''	1¼	1½''-2''	" "	20''	6½''	240	10600
Forstherr	50''	16''	1¼	1½''-2''	Steel Motor	20''	6½''	240	9435
Forstnagel....	96''	20''	3 to 6 cir	1½''-2''-3''	Heavy	20''	6½''	300	17000
Forstzins......	Special 120 Horizontal	20''		1½''-2''-3''	"	20''	6½''	300	19200



"REGULAR" ENTIRELY AUTOMATIC GEAR CUTTER.

For Cutting Spur, Bevel, Worm and Face Gears.

"REGULAR" ENTIRELY AUTOMATIC GEAR CUTTERS.

The gear cutter shown on the opposite page is adapted to a wide range of work. The following paragraphs enumerate its principal features. The worm wheel and worm have V shaped teeth which have been found to give the most satisfactory results. The worm dividing wheel is large and made by a process insuring great accuracy.

INDEX and CHANGE GEARS are provided for cutting all numbers up to 100, all but prime numbers to 200 and higher ones.

AN AUTOMATIC SAFETY DEVICE disconnects the feed of the cutter carriage, should the machine in any way, be started before the divisions have been fully completed.

THE AUTOMATIC FEED can be disconnected at any time by the simple movement of a lever so that the slide can be fed in or out by hand.

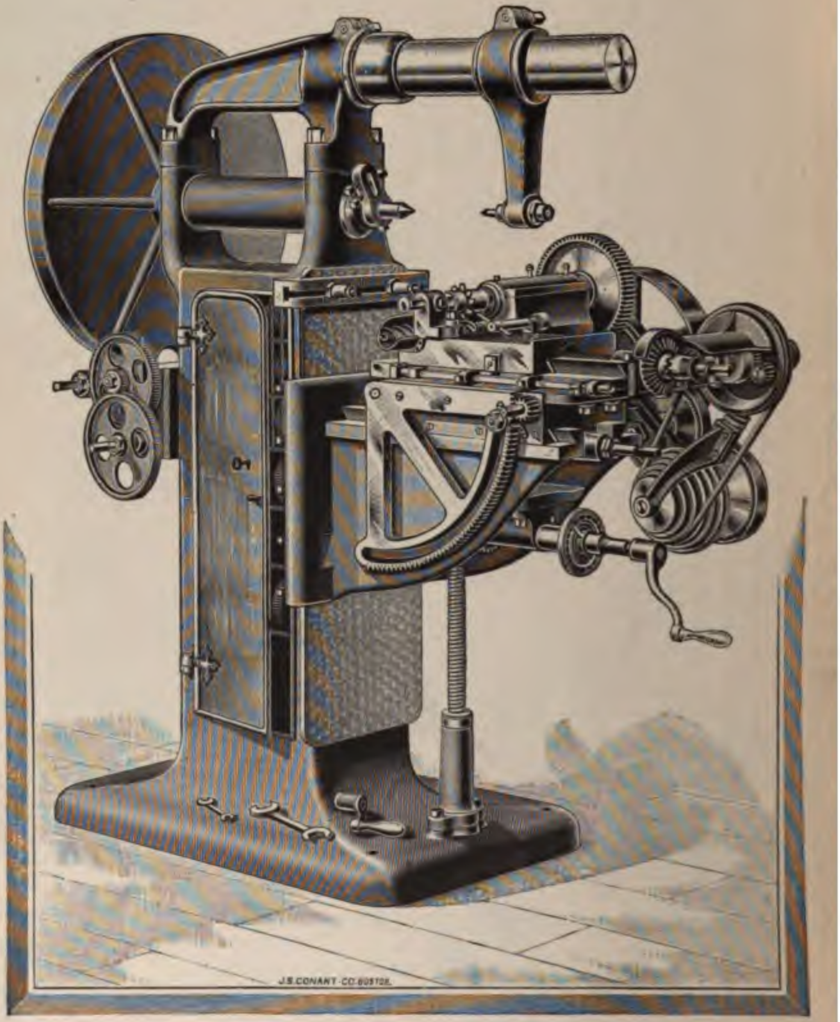
THE CHIPS are carried away from under the cutter automatically and deposited at the base of the machine.

THE SUPPORT or overhanging arm to hold the outer end of gear mandrel is a desirable feature in cutting solid pinions or using long mandrels. The arm is of such a shape that the sliding bearing may be removed entirely to examine or test work.

To take the strain of the cutter in cutting large gears an adjustable rim brace is furnished.

SPECIFICATIONS.

Code Word.	Capacity Will Cut.		Pitch Diametral.	Diam. of Cutter Arbor.	Class of Work.	Countershaft.			Weight Boxed about	Floor Space.	Price.
	Diam.	Width Face.				Diam. of Pulleys.	Width Face.	Revs.			
Fortium	22"	5"	6	1¼"	Light	10"	3"	250	1800	64"x 45"	$............
Fortlet	30"	8"	5	"	Light and Medium	10"	3' 4"	"	3200	93"x 72"	$............
Fortnight....	36"	10"	3	"	Medium and Heavy	12"	4"	"	4400	93"x 90"	$............
Fortore........	50"	11"	2½	"	"	12"	4"	"	5000	93"x 90"	$............
Fortraire.....	60" Special.	12"	2	1½" & 2"	"	16"	6½"	200	8000	62"x 96"	$ ....
Fortsatz.......	74" Special.	14"	1	"	Heavy	"	"	"	12000	78"x108"	$............


J.S.CONANT CO. BOSTON.

36-INCH AUTOMATIC GEAR CUTTING MACHINE.

36-INCH AUTOMATIC GEAR CUTTING MACHINE.

As its name implies, this machine is automatic in all its movements. After being set and started, the cutter feeds through the gear blanks, returns rapidly to the starting point, the dividing wheel rotates to the exact place for the next tooth, and repeats the operation indefinitely, without further attention from the operator.

The Dividing Wheel, which is made in two parts, is by improved processes brought to practical perfection, the final corrections being made under a microscope. This wheel is actuated by a steel worm, with compensating devices for maintaining the original accuracy. It is protected from dust and injury by a close-fitting iron shield. and the actuating worm runs in an oil box.

A centering device fixes the exact center of cutter, without reference to the position of the knee or other parts. A dial, reading to the thousandths of an inch, connecting with the elevating screw, enables the cutter to be set to the correct depth without using lines or depth gauges. One of the quadrants, which sustains the cutter carriage at any required angle, is graduated to degrees, and the cutter can be fed at any angle through an arc of over ninety degrees, running equally well vertically or horizontally. The cutter carriage can also be set at an angle either way in a horizontal plane, and has a graduated scale defining the angle.

The automatic feed is so arranged that the feed cones and the feed belt run always in one direction, yet feeding both ways, and running back about forty times faster than forward. There is no reversal of driving parts, therefore no shock, the whole movement being smooth and practically noiseless even at high speeds.

The dividing mechanism is driven by a belt running mostly on a loose pulley, but partially on a fast pulley by its side, the amount on the fast pulley being graduated by adjustable fingers.

An adjustable Rim Rest is provided, which prevents chattering. The working parts are in the strongest position when cutting the largest gears.

AUTOMATIC GEAR CUTTING MACHINES, STYLE B.

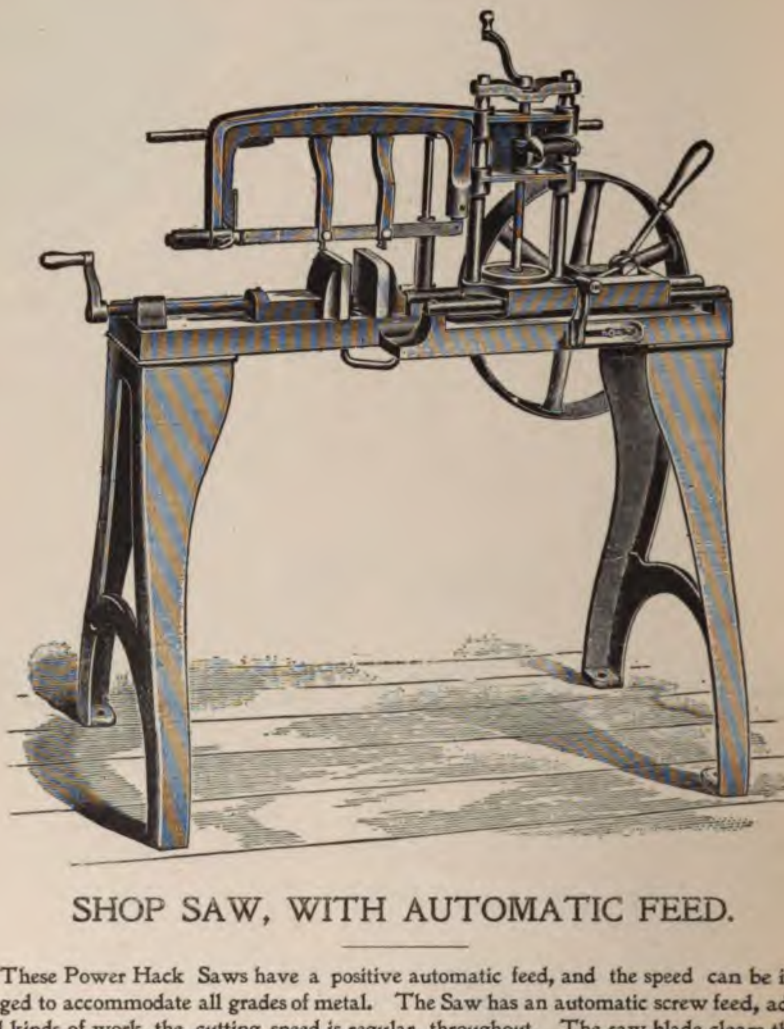
SPECIFICATIONS.

Code Word.	Size.	Diam. Will Cut.	Width Face Will Cut	Extreme Length of Feed.	Feed Per Minute.	Ecomical Limit of Pitch.	Shipping Weight.	Weight of Driving Belt.	Weight.	Price.
Fountful.......	18"	18"	4"	6¾"	2" to 7"	6	1485	2½"	....	$...............
Fourbe	24"	25"	6"	9"	1½" to 6"	5	2200	3"	....	$...............
Fourbir	36"	36"	8"	11⅜"	1" to 5"	3	3230	3½"	....	$...............
Fourche.......	48"	50"	12"	16"	½" to 3"	2	5150	4"	....	$...............
Fourchon	60"	60"	15"	Made	when	specially	ordered		....	$...............

Coarser pitches can be cut and faster feeds used if desired, on all sizes.

PART XVI.

METAL SAWING MACHINES.

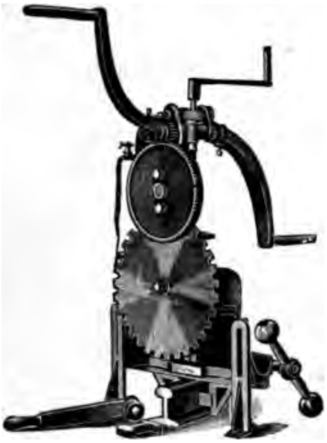


SHOP SAW, WITH AUTOMATIC FEED.

These Power Hack Saws have a positive automatic feed, and the speed can be instantly changed to accommodate all grades of metal. The Saw has an automatic screw feed, adjustable to all kinds of work, the cutting speed is regular throughout. The saw blade clears the metal on backward stroke, thus actually saving 50 per cent. of wear. The blades run in guides insuring square cuts. A moveable vise allows the use of entire blade. Furnished with extra saw blades.

SPECIFICATIONS.

Code Word.	No.	Capacity.	Driving Pulleys.		Weight.	Price.
			Size.	Speed.		
Fourm	1	4½″ & less	14x2½″	50	125 lbs	$ ....
Fourmont.	2	5″ & less	14x2½″	50	140 lbs	$ ....
Fournache	4	7″ & less	14x3″	50	275 lbs	$ ....
Fournaise........	8	3″x12″	14x2½″	150	300 lbs	$ ....



PORTABLE RAIL SAW.

For Street or Steam Rails. Beams, Angles, Channels and Shafting up to 6 inches. Straight or angle cuts. Easily and quickly attached or released from work.

The great decrease of power required is explained by the principle not before used on any such machine, whereby the power is directly applied to the saw blade on its periphery.

With this Portable Machine continuous cutting can be done with little effort on account of its ease of action.

The construction of our Saw is such that each tooth acts as a planing cutter, leaving the work perfectly true and smooth, and does not disturb the temper of the Metal.

Accuracy to $\frac{1}{100}$ of an inch assured.

Two saw blades furnished with each machine.

SPECIFICATIONS.

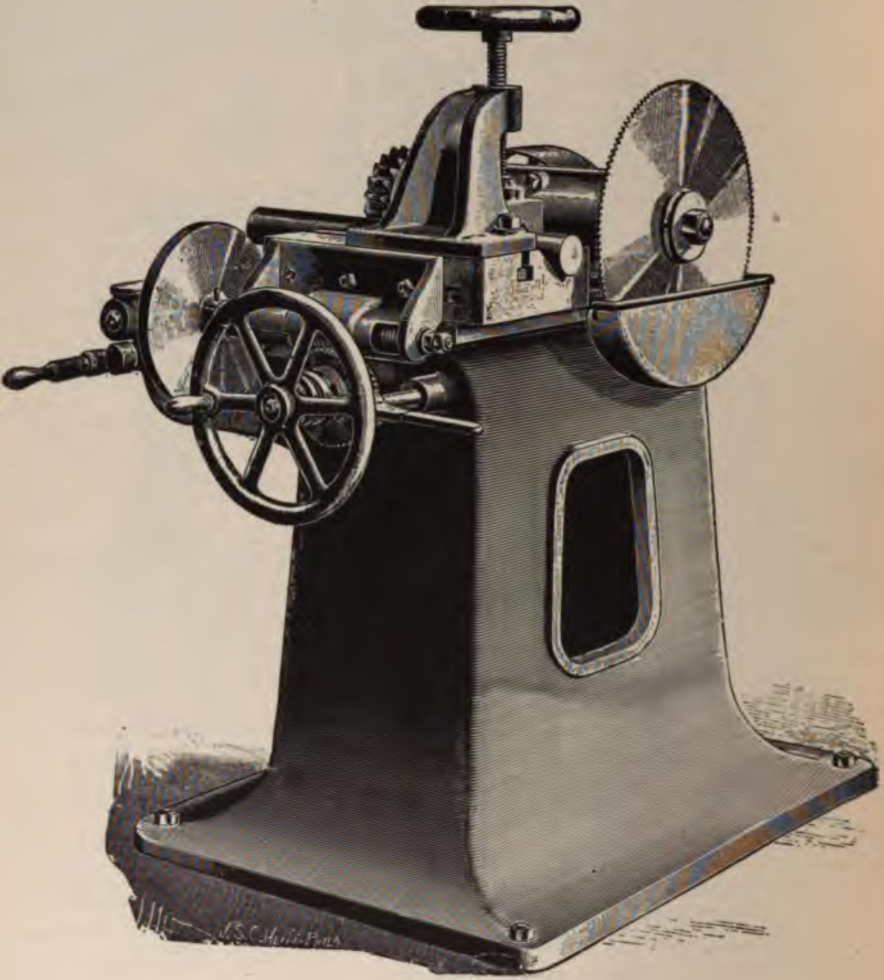
Code Word.	No.	Capacity up to	Automatic Feed Per Minute.	Weight Boxed.	Price.
Fourneaux.........	5	6''	¾''	300 lbs.	$...............
Fournimes.........	5A	6''	¾''	300 lbs.	$..............
Fourrage...........	6	9''	¾''	400 lbs.	$... ....
Fourrer.............	6A	9''	¾''	400 lbs.	$...............

Nos. 5 and 6 designed for square cutting only, such as rails, beams, tees, etc. Valuable for street rail-work, cutting rail ends. Operated by one or two persons.

Nos, 5A and 6A designed for square or angles up to 45 degrees. Especially valuable for street railways, in constructing frogs, crossings or relaying.

Nos. 5 and 5A furnished complete with two 16-inch saw blades.

Nos. 6 and 6A furnished complete with two 20⅛-inch saw blades.



No. 2 COLD CUTTING-OFF SAW.

COLD CUTTING-OFF SAWS.

These machines have been designed with great care to fill a place of long felt want in every machine shop, i. e., cutting merchant bar metals into suitable and accurate lengths, leaving the surface square and smooth to receive the lathe centers and for other purposes.

The mandrel carrying the saw is made of hammered steel 3 inches in diameter, mounted in heavy, substantial bearings, lined with gun metal and driven by a worm wheel made of phosphor bronze, which in turn is actuated by a hardened steel worm.

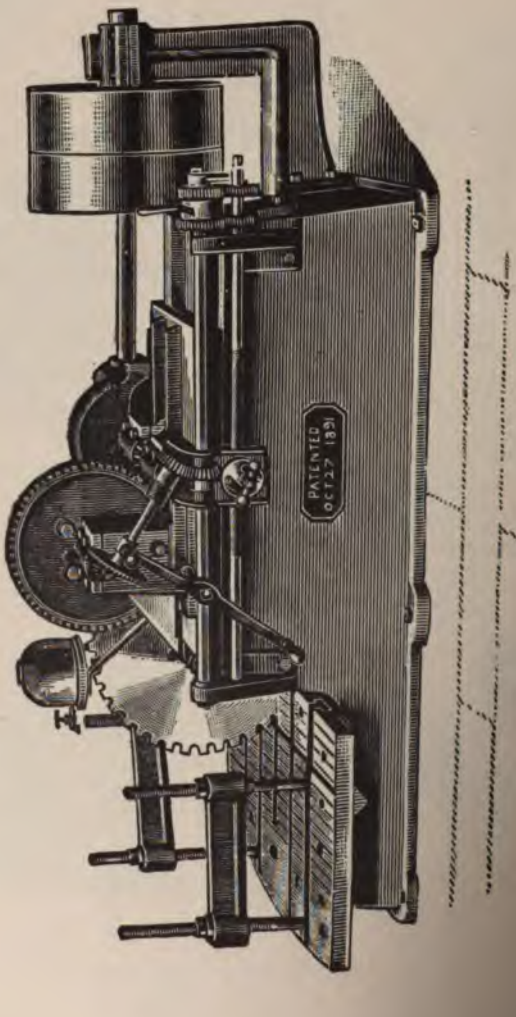
FEED is variable and automatic and can be changed instantly from slow to the fastest.

Other and larger machines are made for any desired purpose.

DETAILS furnished with each machine and included in estimates are two saws, countershaft and a full set of wrenches.

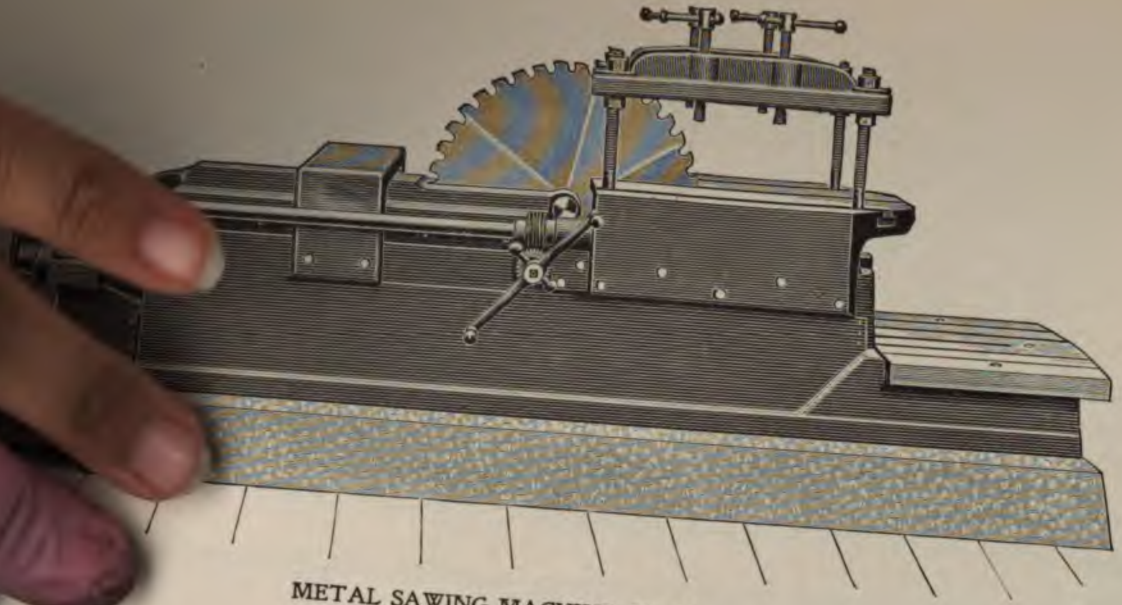
SPECIFICATIONS.

Code Word.	No.	Cuts off	Size of Saw.	Countershaft.			Weight.	Price.
				Diam. T&L Pulleys.	Face.	Revs.		
Fovente........	2	5"	18¾" dia.	12"	6"	250	1900 lbs.	$ ....
Foveole.........	3	7"	30" dia.	12"	6"	250	3200 lbs.	$ ....



METAL SAWING MACHINE No. 10.

See Description, page 252.



METAL SAWING MACHINE No. 20.

See description, page 252.

METAL SAWING MACHINES.

The Machines shown on pages 250 and 251 are designed for architectural iron work; for making frogs, crossings and switches, and for use in forge shops, etc.

By driving the saw from its periphery it is possible to use very coarse teeth, which act as a milling cutter, preventing choking of or destroying teeth and blades, which occurs where fine teeth are used.

They are provided with adjustable sprockets, allowing 6-inch wear of saw blades without change.

Bearings of saw arbor are bushed with phosphor bronze. Split feed nuts are made of bronze. They are provided with automatic stops and have our latest feeding mechanism, allowing feed to be changed instantly, to slow or fast, while machine is in motion. Built very substantially and geared down 30 to 1, requiring a very small amount of power. The sprocket which drives the saw is made of Park Brothers' special steel, and fully guaranteed.

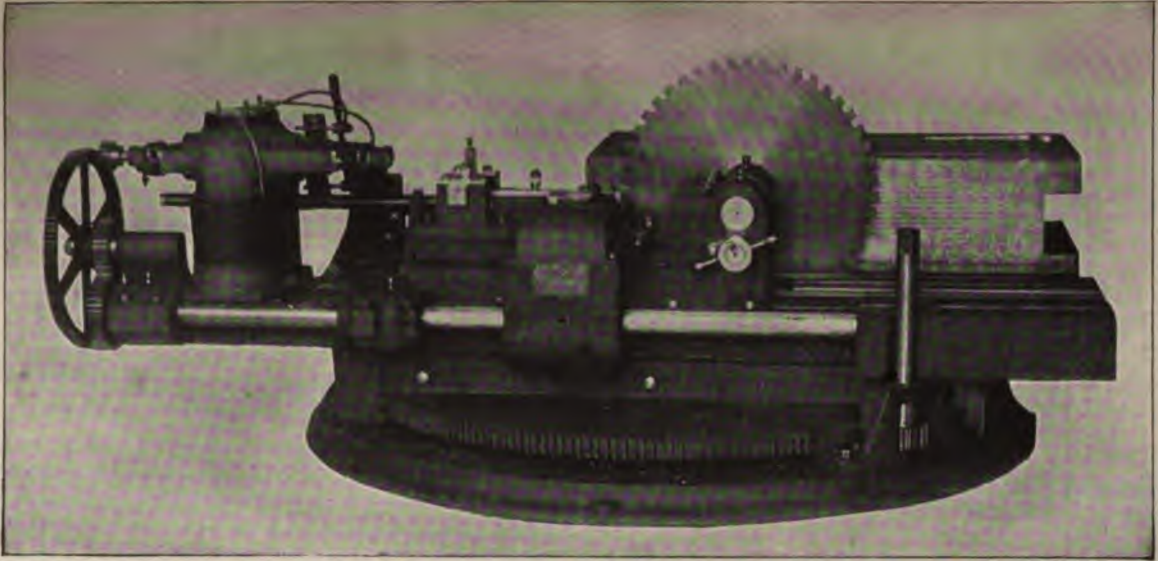
They are furnished complete with Grinder and two Saw Blades.

SPECIFICATIONS.

Code Word.	No.	Capacity up to	Angles up to	Diam. of Saw.	Horizontal Travel.	Automatic Feed Per Minute.	Rev. of Drivingshaft.		Floor Space.	Weight.	Price.
							Beams and Forgings.	Rails.			
Foussier.......	10	15"	45 deg.	2½"	18"	⅜"-⅝"-1⅛"	115	100	2'x7'	2400	$..........
Foutief.........	15	10"x24"	†	26"	28"	¼"-½"-¾"-1"	140	125	3'6"x9"	7000	$........
Fovela..........	20	24"	*	30" or 31¼"	40"	½"-1"	120	120	2½'x11½"	6000	$.. ....

*Any angle cut up to 36 inches long by 12 inches deep on upper table. Also upper rails, channels, beams, etc. up to 24 inches. "I" beams edgwise, square or angle cut.

†Any angle up to 28 inches long, or by reclamping can cut any length desired as all mechanism is below level of upper table.



METAL SAWING MACHINE, No. 15-WITH CIRCULAR BASE.

Equipped with Electric Motor.

See description on page 254.

METAL SAWING MACHINE, No. 15, WITH CIRCULAR BASE.

EQUIPPED WITH ELECTRIC MOTOR.

Especially designed for structural iron workers, bridge builders and others who handle beams, channels, etc., in limited space, also suitable for general work: has double the capacity of any saw in the market at same price.

This machine contains several improvements among which are increased feeding speeds; prolonged life of saw blades; lateral adjustment of saw blades. The feeding mechanism has been much improved and change can be made from slow to fast, or vice versa, without stopping the machine. The saw carriage is provided with quick return by means of rack and pinion. All bearings are adjustable to compensate for wear, and the machine throughout is made of best material, the saw arbor of Jessop's steel, worm wheel of phosphor bronze engaging with steel worm.

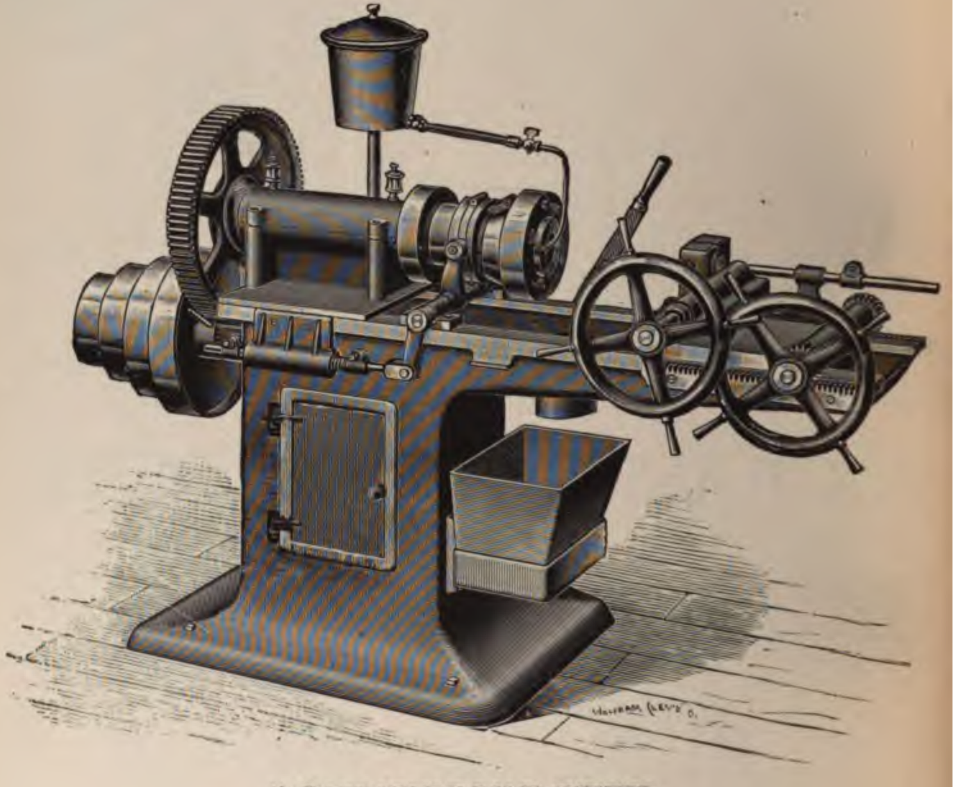
The machine shown in cut is equipped with motor and circular base. We also furnish this machine on stationary base with tight and loose pulleys for belt power. Each machine sold complete with two saw blades and grinder and oil pump for lubricating the saws, including oil tank, wrenches, etc.

Weight	7000 lbs
Floor space	9 ft. circular
Horse power required	3
Speed of driving shaft	140
Speed of saw blades	3¾
Feeding speeds	¼, ½, ¾, 1-inch min
Size of saw arbor	3 inches
Size of driving shaft	2¼ inches
Size of sprocket	6½ inches D. x 2 inches thick, cast steel
Size of work tables, upper	20-inch x 48-inch and 22-inch x 18-inch
Capacity	Solids 24-inch x 10-inch, at all angles
Horizontal travel of saw	28 inches
Available diameter of saw above upper table	10 inches
Diameter of saw blades	26 inches
Thickness of saw	¼ inch
Lateral adjustment of saw	1⅜ inch
Adjustment of sprocket	2½ inches, allowing for 6 inch wear of saws
Height of work tables	24 inches
Lower	24 inches by 48 inches and 22 inches by 18 inches

Base swivels 90 degrees by segmental rack and pinion.
Code Word, Fovelarum. Price, $

PART XVII.

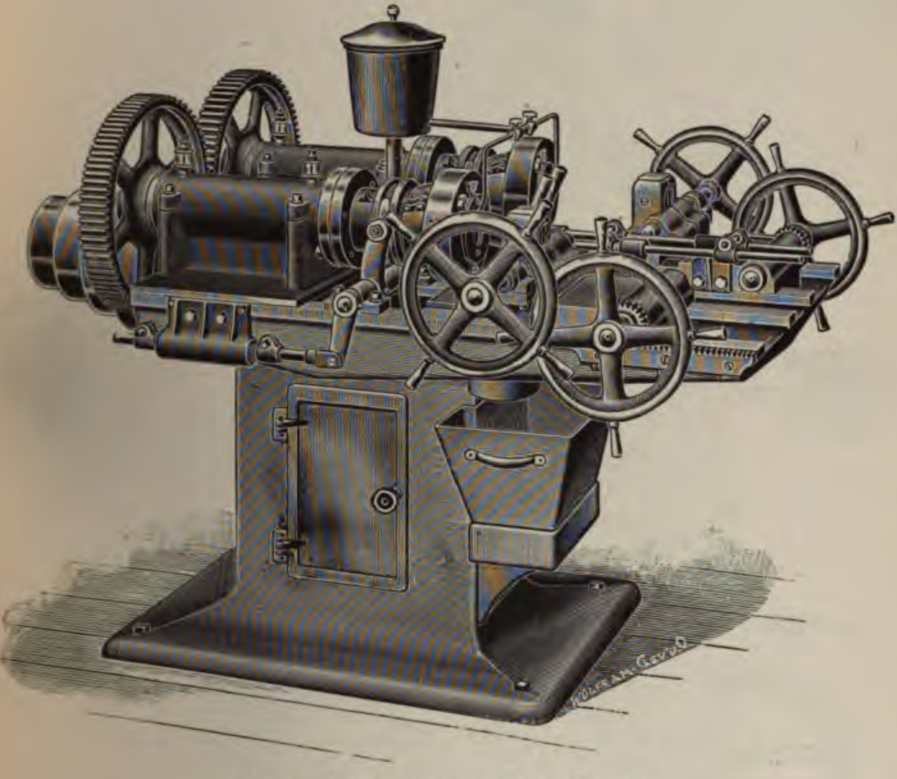
BOLT AND NUT MACHINERY.



1½-INCH SINGLE BOLT CUTTER.

CLASS A.

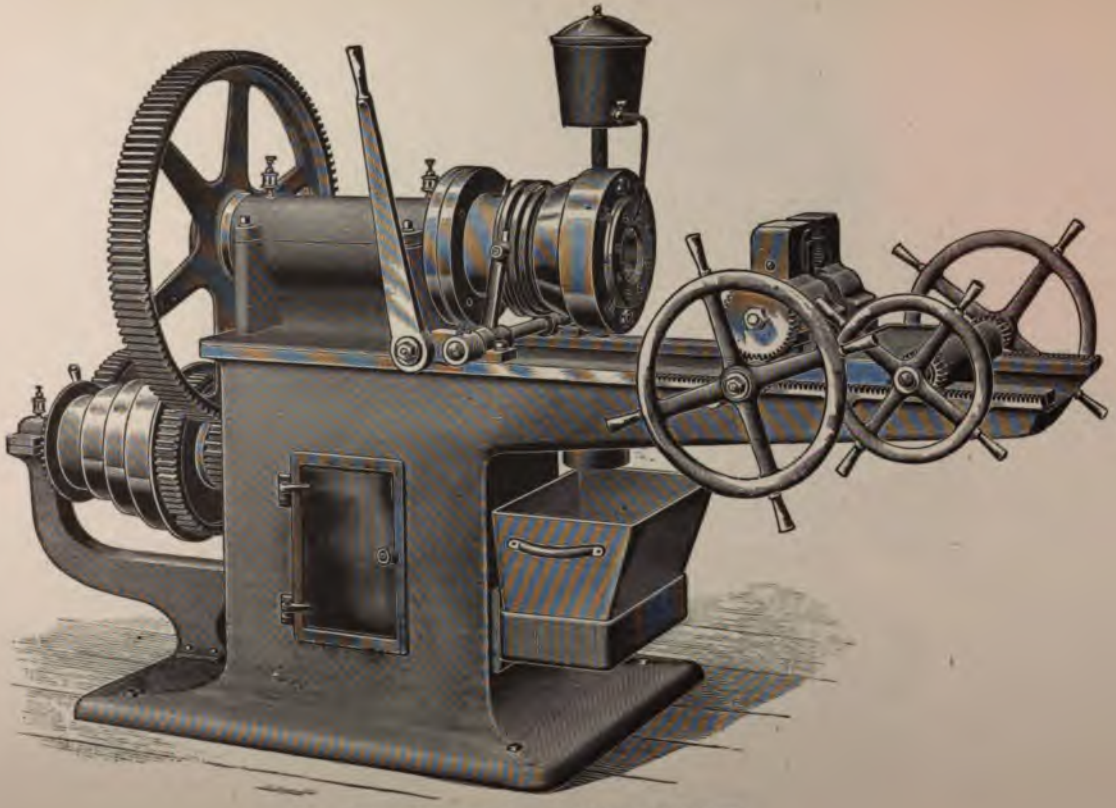
For Description See Page 259.



1½-INCH DOUBLE BOLT CUTTER.

CLASS A.

For Description See Page 259.



3½-INCH SINGLE BOLT CUTTER.

CLASS A.

For Description See Opposite Page.

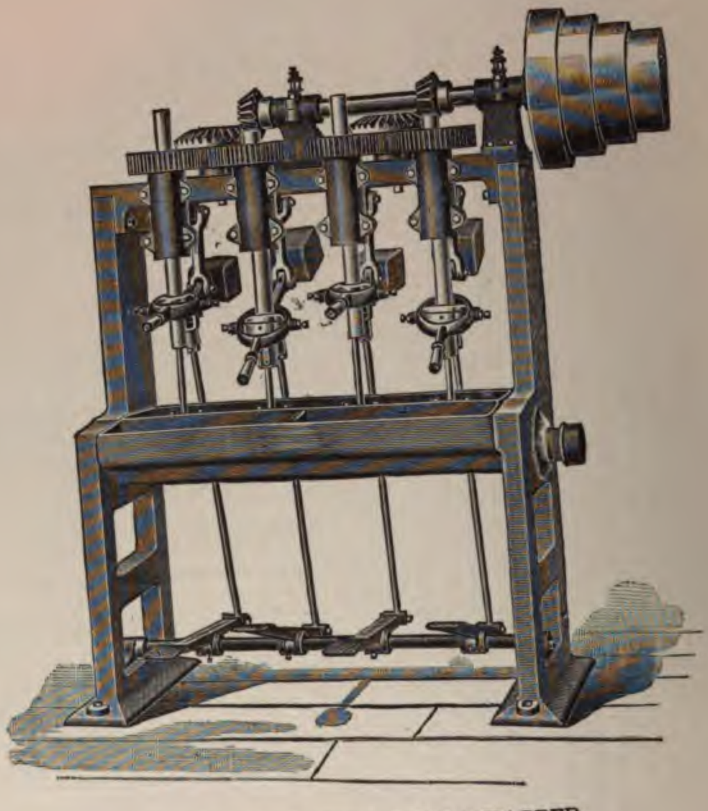
BOLT CUTTERS.

The machines illustrated on pages 256, 257 and 258possess many points of excellence. The head is composed of but three parts, is very simple and all details are made to standard guages, the dies being interchangeable. Right and left handed thread can be cut with the same head. Lubrication of the dies is secured by a small pump, which keeps the oil in constant circulation, pumping it up from the solid cast iron base into which it runs, after having lubricated the dies and flowed into the tray under them. The size of the stream used may be controlled by altering the throw of the plunger, which is adjustable. Each set contains four dies, which are made to fit the hardened tool steel bushings in the head. Stripping of the threads is impossible.

An important feature of the head is that of the die ring which is connected directly to the barrel, a point of advantage for uniformity of product which exists in no other bolt cutter head on the market. The adjusting screw is made with a fine thread so that bolts may be cut to the exact size required, and when adjusted, it is clamped firmly into place by means of a threaded bushing. All heads are supplied with an index, and when a record is kept of the dies, the head may be set to cut the required size without the necessity of making several cuts to accomplish this end:

SPECIFICATIONS.

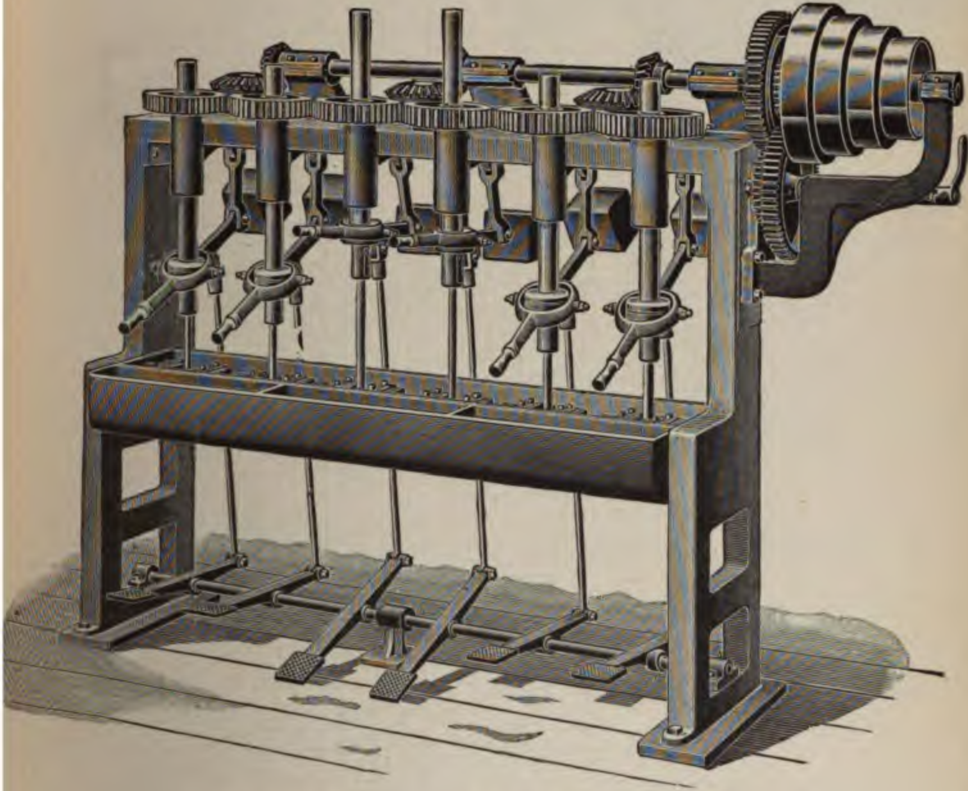
Code Word.	Size.	Style.	Capacity to Thread Right or Left Hand.	Seats of Dies for each Machine.	Width of Cone Belt.	Floor Space.	Countershaft.			Geared	Weight.	Price.
							Diam. of Tight and Loose Pulleys.	Width of Face.	Revs. per Minute.			
Fragatao.......	1″	Single	¼ to 1″	7	3″	6′x2′-3″	16″	4″	100		1500	$..........
Fragatinha....	1″	Double	¼ to 1″	12	3″	5′2″x3′8″	16″	4″	225	3½ to 1	2200	$..........
Frage...........	1¼″	Single	⅜ to 1¼″	8	3″	6′x2′-3″	16″	4″	225	4½ to 1	1650	$.. ....
Fragelle........	1¼″	Double	⅜ to 1¼″	13	3″	5′6″x3′	16″	4″	225	4½ to 1	2500	$. ....
Fragesatz.....	1½″	Single	⅜ to 1½″	9	3″	6′x2′3″	16″	4″	225	4½ to 1	1750	$..........
Fragescas.....	1½″	Double	⅜ to 1½″	14	3″	5′10″x3′	16″	4″	225	4½ to 1	2700	$ ....
Fragewort.....	2″	Single	⅜ to 2″	11	3″	7′3″x2′7″	16″	4″	225	6¼ to 1	2400	$..........
Fragifere......	2″	Double	½ to 2″	20	3″	7′10″ 3′10″	16″	4″	225	6¼ to 1	4200	$..........
Fragil...........	2¼″	Single	½ to 2¼″	12	4″	8′2″x3′	16″	4″	225	6¼ to 1	3100	$..........
Fragilely......	2½″	"	½ to 2½″	13	3″	8′4″x3′	16″	4″	225	27¼ to 1	3300	$..........
Fragiles........	3″	"	½ to 3″	13	3″	8′4″x3′	16″	4″	225	27¼ to 1	3500	$..........
Fragilibus....	3½″	"	½ to 3½″	15	3″	8′4″x3′	16″	4″	225	27¼ to 1	3700	$..........
Fragilidad....	4″	"	1 to 4″	13	4″	9′7″x3′	16″	4″	200	27¼ to 1	4300	$..........
Fragilimo....	5″	"	1 to 5″	15	4″	9′7″x3′	16″	4″	200	27¼ to 1	4800	$..........
Fragilitas....	6″	"	1 to 6″	17	4″	9′7″x3′	16″	4″	200	27¼ to 1	5200	$..........



1-INCH FOUR SPINDLE NUT TAPPER.

CLASS A.

See Description on page 262.



1½-INCH SIX-SPINDLE BACK GEARED NUT TAPPER.
CLASS A.

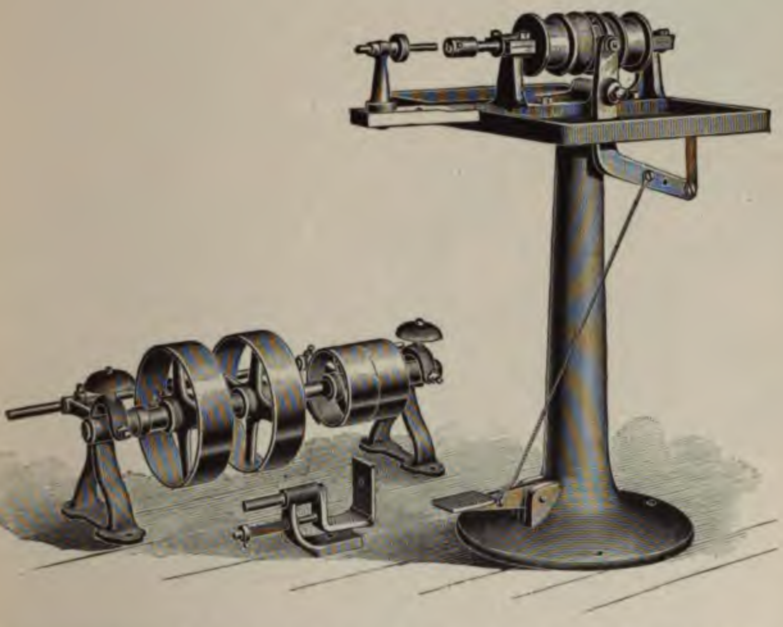
See Description on Page 262.

FOUR AND SIX SPINDLE NUT TAPPERS.

The machines shown on pages 260 and 261 have adjustable nut holders and quick acting sockets. Taps can be removed and replaced while the machine runs at full speed. The spindles are counterbalanced to prevent the breaking of taps, which are sometimes broken by heavy spindles. Each pair of spindles run at different speeds, but can be arranged to run at one speed if desired.

SPECIFICATIONS.

Code Word.	Size.	No. of Spindles.	Suitable for Tapping.	Number of Sockets and Number of Taps with Each Machine.	Width of Cone Belt.	Floor Space.	Countershaft.			Geared.			Weight.	Price.
							Diam. of Tight and Loose Pulleys.	Width of Face.	Revs. per Minute.	First Pair of Spindles.	Second Pair of Spindles.	Third Pair of Spindles.		
Frailly.....	1"	4	⅜" to 1"	6	3	5'3"x2'2"	16"	4"	300	4¾ to 1	3¼ to 1		2500 lbs.	$..........
Fraineza..	1"	6	⅜" to 1"	6	3	6'10"x2'2"	16"	4"	300	4¾ to 1	3¼ to 1	2¼ to 1	3000 lbs.	$..........
Fraisage..	1½"	4	½" to 1½"	9	3	6'0"x2'6"	16"	4"	300	5½ to 1	4¼ to 1		3200 lbs.	$..........
Fraiser....	1½"	6	½" to 1½"	9	3	8'0"x2'6"	16"	4"	300	5½ to 1	4¼ to 1	3½ to 1	3700 lbs.	$..........
Fraiserat..	1½"	4	½" to 2"	11	4	7'4"x2'6"	16"	4"	300	22½ to 1	17¼ to 1		3400 lbs.	$..........
Fraisoir...	1½"	6	½" to 2"	11	4	9'4"x2'6"	16"	4"	300	22½ to 1	17¼ to 1	13¾ to 1	4200 lbs.	$..........



IMPROVED HORIZONTAL TAPPING MACHINE

The above cut represents a machine designed for light, rapid tapping. The spindle is driven by two 1¾ inch belts, running in reverse directions, giving a speed of 1200 to 1500 revolutions per minute. The reversing of the tap is accomplished by releasing the foot pressure from treadle, which, through the means of a lever, actuates a friction cone.

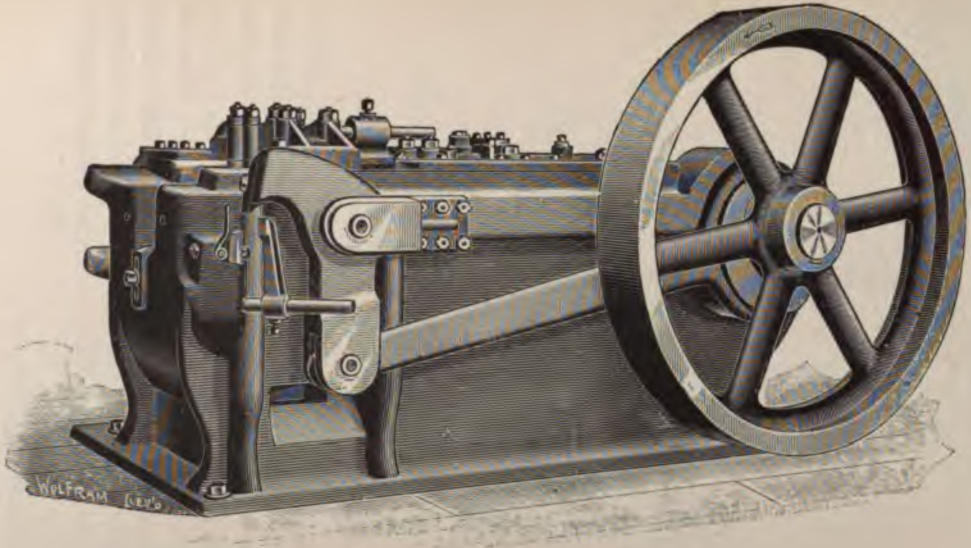
The machine is fitted with a flat sliding plate and a revolving spindle; the latter, we especially recommend for tapping small pieces. This spindle may be fitted with a holder, suitable to retain the work, and is wholly under the operator's control. If from any cause the tap becomes caught, it may be instantly released and allowed to revolve, with work attached, without danger of breaking the tap.

Machine is fitted with a substantial countershaft and chuck.

It can be furnished without the column if required.

Speed of countershaft, 425 revolutions per minute. Shipping Weight of machine and countershaft complete, 375 lbs.

Code Word, Frayeras. Price $......................



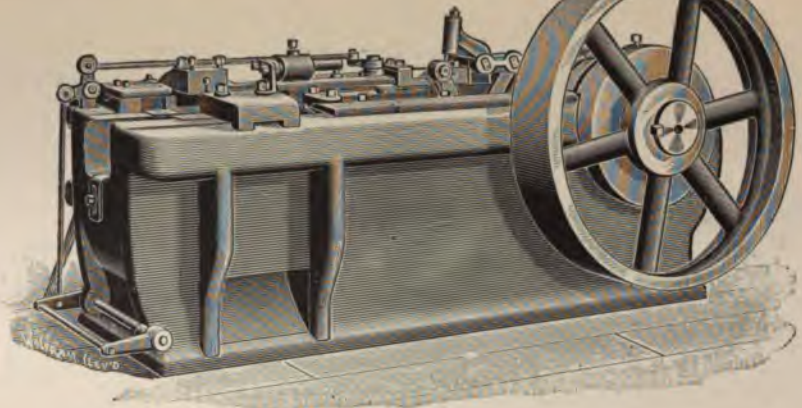
CUT SHOWS 1½-INCH MACHINE.

BOLT HEADERS.

These machines have a continuous motion and are provided with an automatic relief to prevent breaking. All bearings are bushed with gun metal. They will make not only bolts, but rivets, upsets and small forgings.

SPECIFICATIONS.

Code Word.	Capacity.	Belt Wheel.			Floor Space.	Width on Skids.	Boxed for Export.		Price.
		Diam.	Face.	Revs.			Weight.	Cubic Feet.	
Francavate ..	¾" and under	46"	6"	100	7'0"x3'4"	5500 lbs	6100 lbs	61	$..........................
Francesco.	1" and under	46"	6"	100	7'0"x3'6"	6[illegible]00 lbs	6600 lbs	65	$..........................
Franchado. .	1¼" and under	51"	8½"	95	7'0"x4'2"	8000 lbs	8700 lbs	150	$..........................
Franchezza	1½" and under	56"	8½"	90	7'0"x5'6"	[illegible] lbs	9700 lbs	155	$..........................



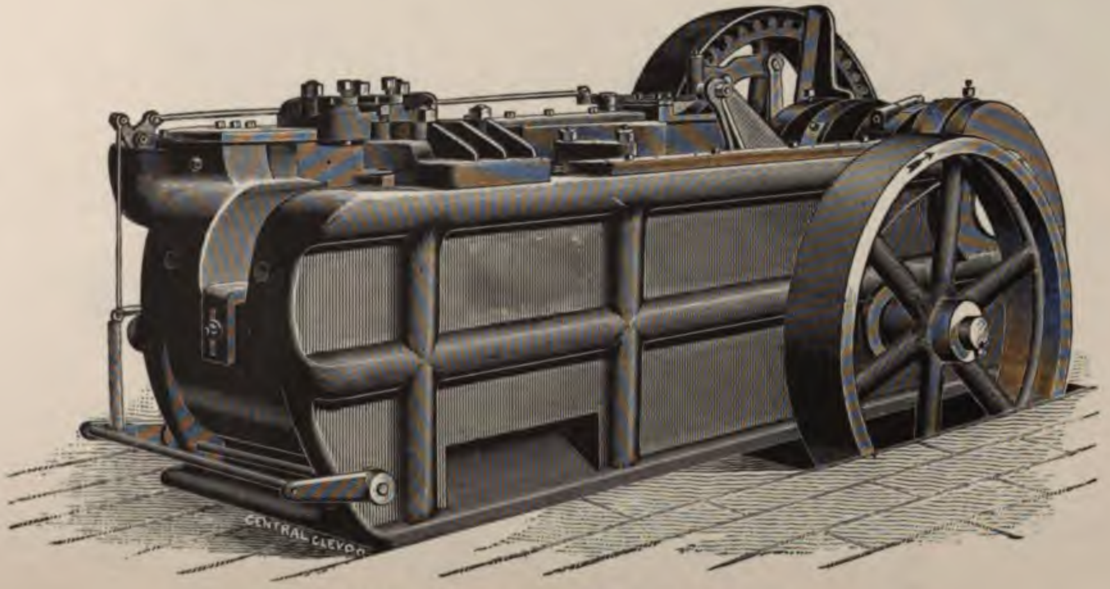
CUT SHOWS 1-INCH MACHINE.

HEADING, UPSETTING AND FORGING MACHINES.

These machines have an automatic stop, holding them wide open after one or more revolutions. An automatic relief prevents breakage. All bearings are bushed with gun metal. They will make ordinary forgings, rivets, bolts and up-sets.

SPECIFICATIONS.

Code Word.	Capacity.	Belt Wheel.			Floor Space.	Weight on Skids.	Boxed for Export.		Price.
		Diam.	Face.	Revs.			Weight.	Cubic Feet.	
Francici........	1″ and under	46″	6″	100	7′0″x 3′6″	7000 lbs	7600 lbs	65	$.. ....
Francien........	1½″ and under	56″	8½″	85	7′0″x 5′6″	12000 lbs	12800 lbs	190	$....... ....
Francisca......	2″ and under	56″	8½″	75	9′0″x 5′5″	18000 lbs	19000 lbs	206	$.......... ....
Francollo......	2½″ and under	40″	8½″	50	9′2″x 5′8″	20000 lbs	21200 lbs	210	$.. ....
Francorum ...	3″ and under	40″	9½″	50	10′3″x 5′8″	28000 lbs	29500 lbs	220	$......... ....
Francotes	3½″ and under	44″	10½″	50	10′6″x 6′0″	35000 lbs	37000 lbs	330	$....... ....
Franduno ...	5″ and under	54″	11″	30	14′5″x 7′8″	80000 lbs	83000 lbs	637	$.......... ....
Frangalho. ..	6″ and under	54″	11″	25	17′2″x11′2″	100000 lbs	105000 lbs	962	$..,...... ....



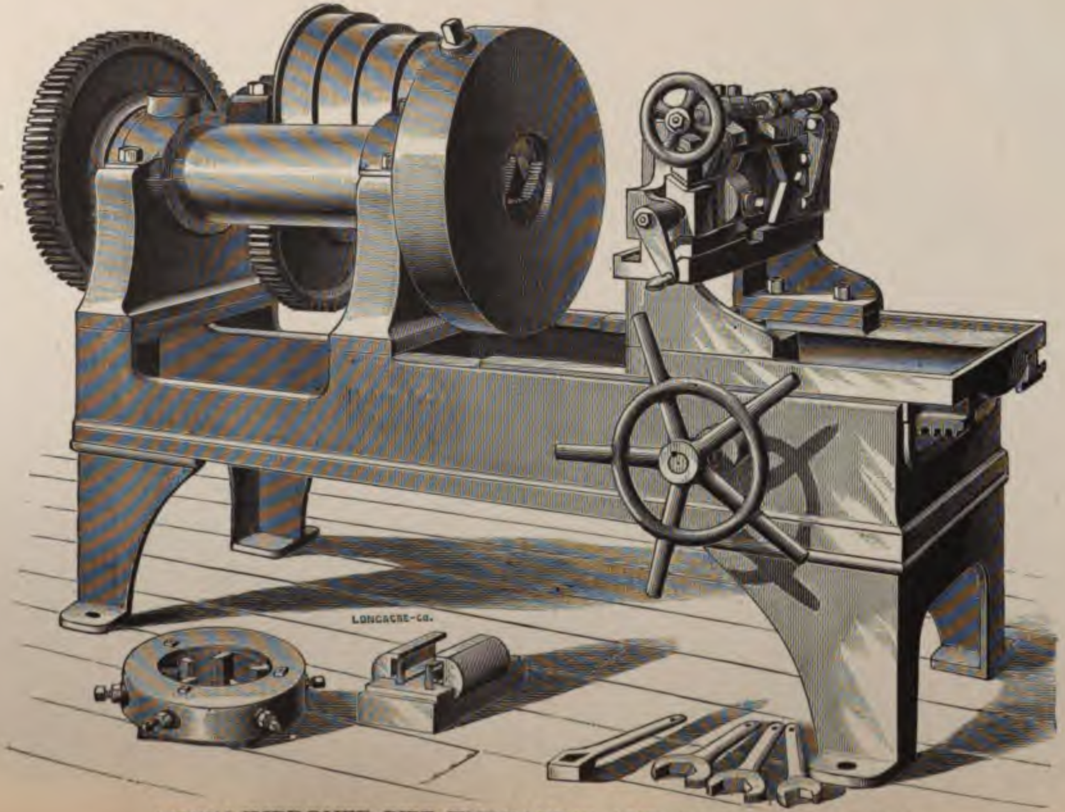
5-INCH HEADING, UPSETTING AND FORGING MACHINE.

The 2-inch and smaller sizes are direct driven. The 2½-inch and larger sizes are geared.

For Specifications see Page 265.

PART XVIII.

PIPE CUTTING AND THREADING MACHINERY.


LONGACRE-CO.

6-INCH IMPROVED PIPE THREADING AND CUTTING MACHINE.

PIPE CUTTING AND THREADING MACHINES.

All the machines on the list are of similar design and construction, the difference being in the sizes and proportions. The 4-inch and 6-inch machines have four speeds on the cones, and are double geared; the 2-inch and 3-inch machines have three speeds on cones,and are also double geared; each speed is calculated for the best practical results for the sizes to be cut. A change of one wheel only is necessary to alter the machine from single to double gear and vice versa. Gearing is cast from cut iron patterns of the most approved form, and is almost noiseless in its action. They all have Universal Chuck for gripping pipe; also Universal Guide Chuck on carriage or cutter-head, and independent chucks at back of barrel, avoiding the use of bushings. The cutting-off slide has very long bearing, is operated by handle and screw, is gibbed and provided with adjusting screw to take up the wear, and is quickly and truly adjustable to the different sizes of pipe. The Die slides in head across machine, entirely out of way of pipe, and need not be removed from machine when cutting off pipe. Carriage has long range on bed, is moved by shaft fitted with two pinions working into racks, and operated by hand-wheel. Pipe can be threaded close up to the gripping chuck. Complete with counter-shaft and wrenches. Separate Die Head for each size of pipe.

SPECIFICATIONS.

Code Word.	No. or Size.	Capacity to Thread and Cut Off.	Countershaft.			Price
			Diam. Pulleys	Face Pulleys	Speed Revs.	
Freccio	2	Solid dies ¼" to 2"	12"	3"	200	$300
Freccione	2	" " ¼" to ⅜" Expansion dies ½" to 2"	"	"	"	400
Freccioso	3	" " ¼" to 2" Cutter dies 2½" to 3"	14"	3"	200	400
Frecheiro	3	" " ¼" to ⅜" Expansion dies ½" to 3"	"	"	"	540
Frechhans	4	" " ¼" to 2" Cutter dies 2¼" to 4"	15"	4"	175	500
Frecuencia	4	" " ¼" to ¾" Expansion dies 1" to 4"	"	"	"	650
Frecuentes	6	" " 1" to 2" Cutter dies 2½" to 6"	18"	4"	165	800
Freddammo	6	Expansion dies 1" to 6"	"	"	"	1000
Freddarono	8	Cutter dies 2½" to 8"	18"	4"	185	1100
Freddata	18	Expansion dies 2½" to 8"	"	"	"	1200
Freddavamo	10	Cutter dies 2½" to 10"	20"	4"	175	1400
Freddavate	10	Expansion dies 2½" to 10"	"	"	"	1600
Fredderai	12	Expansion dies 4" to 12"	20"	4"	175	2150

Extra Hand Attachment for Nos. 2, 3 and 4, $40.00.

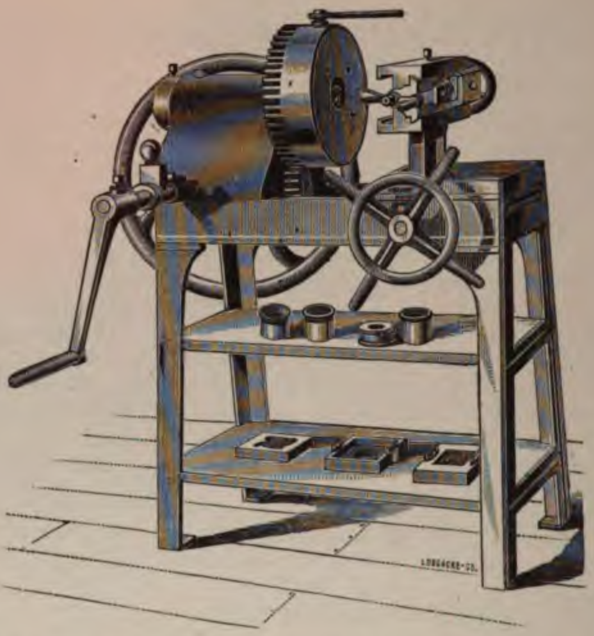
EXTRA REVOLVING DIE ATTACHMENT.

Consisting of Head to carry Dies, and a Universal Gripping Chuck for the Cutting head making Machines, so that thread can be cut with either die or pipe to revolve as may be required.

Code Word	Price.
Freddezza, for No. 2 Machines holds up to 2 inches	$ 45.00
Freddiate, " 3 " " " " 3 "	60.00
Freddiccio, " 4 " " " " 4 "	75.00
Freddoloso, " 6 " " " " 6 "	100.00

ADDITIONAL DIE PLATES.

Code Word	Price
Fredegisus, Price for additional Die Plates for 8-inch Machine	$40.00
Fredegonde " " " " 10 " "	45.00
Fredonnons " " " " 12 " "	50.00



IMPROVED HAND OR POWER PIPE THREADING AND CUTTING-OFF MACHINE.

It is adapted for cutting from ¼-in to 2-inch pipe inclusive. It is double-geared, and is fitted with either solid or expansion dies; is also fitted with a two-speed one for 3-inch belt,and the proper countershaft, pulleys and hangers, for power, in case it is desired to operate it in this manner.

HAND MACHINE.

Cutting and Screwing Pipe ¼ to 2 in. in diameter, with Universal Chuck, Fly Wheel and Solid Dies and full Set of Bushings; also, a set of Sockets for making Nipples ¼ to 2-in. complete.

Code Word, Frayonne. Price $100.00.

POWER MACHINE.

Cutting and Screwing Pipe ¼ to 2-in. in diameter, with Universal Chuck, Cone Pulleys, Countershaft and Solid Dies; also, set of Sockets for making Nipples ¼ to 2-in., and crank to use for hand, complete.

Code Word, Frazangue. Price $125.00.

Bolt Dies and Taps, with Chucks and Holders, furnished at prices to correspond with the sizes required, on application.

Speed of countershaft, 165 revolutions per minute.

Diameter of Pulleys, 10 inches, for 3½-inch belt.

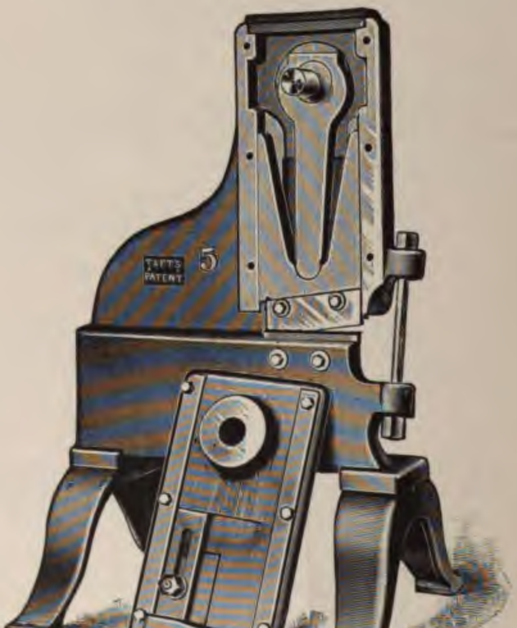
PART XIX.

PUNCHING AND SHEARING MACHINES.

No. 1.
Hand Shear.

No. 1.
Hand Shear and Punch
combined.

No. 1.
Hand Punch.



No. 5 Hand Shear
Showing Internal Mechanism.

HAND PUNCHES AND SHEARS.

These Hand Shears and Punches are made of the best material and in the best manner throughout. Their mechanism is shown in the accompanying cut of the No. 5 Hand Shear, and consists of a slide, carrying upper blade or die, actuated by an eccentric shaft and pitman. This arrangement produces a powerful, positive, easy-working and simple machine, which is very effective in its work and very much liked by its users. The lever may be used equally well at front or at back of Machine. The Shears will cut through sheets of any length or width. The Tie Bolt, shown in cuts, is for use when cutting off very heavy stock. When Shears are to be used only for cutting off stock no wider than the blades are long, we often fill up throat of Shears in the casting so as to increase its strength without the use of the Tie Bolt.

PRICE LISTS. HAND SHEARS.

Code Word	No.	Will Shear Plate Iron	Will Cut Off Round Iron.	Length Blades	Weight	Price	Extra for Hand and Power	Extra for Compound Lever Attachment
Frechheit......	1	¼"	½"	3"	65	$ 22.50	$ 7.50	
Frechmaul....	2	5/16"	⅝"	4"	210	42.00	8.00	
Frechmuth ..	3	⅜"	⅝"	5½"	325	67.00	12.50	
Frechsten	4	7/16"	¾"	7½"	680	95.00	15.00	
Freckled.......	5	½"	¾"	8½"	940	140.00	20.00	$30.00
Fredame.......	6	9/16"	⅞"	9½"	1500	187.00	28.00	33.00
Freddando....	7	⅝"	1"	9½"	2300	250.00		40.00
Freddassi......	8	11/16"	1⅛"	10"	2800	330.00		40.00

HAND PUNCHES.

	No.	Will Punch	Depth Throat	Weight	Price	Extra for Hand and Power	Extra for Compound Lever Att
Fredduzzo ...	1	¼" hole in ¼" Iron.	2½"	65	$ 22.50	$ 7.50	
Fredegar	2	5/16" " " 5/16" "	3½"	210	42.00	8.00	
Frederico	3	⅜" " " ⅜" "	4"	325	67.50	12.50	
Fredonnais...	4	7/16" " " 7/16" "	5"	600	95.00	15.00	
Fredonne......	5	½" " " ½" "	5½"	850	130.00	20.00	$30.00
Fredstole......	6	9/16" " " 9/16" "	12"	1200	187.00	28.00	33.00
Fredulpho.....	7	⅝" " " ⅝" "	13"	2000	250.00		40.00
Fregabais......	8	11/16" " " 11/16" "	13"	2400	330.00		40.00

HAND SHEAR AND PUNCHES, Combined.

	No.	Will Shear Plate Iron	Will Punch	Price.
Fregataire.....	1	¼"	¼" hole in ¼" Iron.	$ 35.00
Fregate.........	2	5/16"	5/16" " " 5/16" "	55.00
Fregatina	3	⅜"	⅜" " " ⅜" "	125.00
Fregatriz.......	4	7/16"	7/16" " " 7/16" "	175.00
Fregatten......	5	½"	½" " " ½" "	237.50
Fregavate	6	9/16"	9/16" " " 9/16" "	310.00
Fregellae......	7	⅝"	⅝" " " ⅝" "	420.00
Fregellis.	8	11/16"	11/16" " " 11/16" "	550.00

POWER PUNCHING AND SHEARING MACHINES.

We illustrate on the following pages a line of punching and shearing machines possessing many features of special merit.

The cam shafts are of the best hammered iron or steel; run in large bearings bushed with bronze, and the forward end projects through the face plate, thus giving it a bearing on both sides of the cam, preventing, thereby, its bending or breakage. The front end of the shaft is fitted with a capstan or hand wheel by means of which the shaft may be operated by hand in setting the dies, etc. The slide is actuated by a sliding steel faced clutch on the cam shaft which engages a clutch on the spur gear, when the foot treadle, or hand lever, is depressed. At an extra price these machines can be provided with an automatic stop, holding the slide at any desired point after a single stroke. By hooking down the foot treadle, or hand lever, the slide will work continuously as though there were no stop motion.

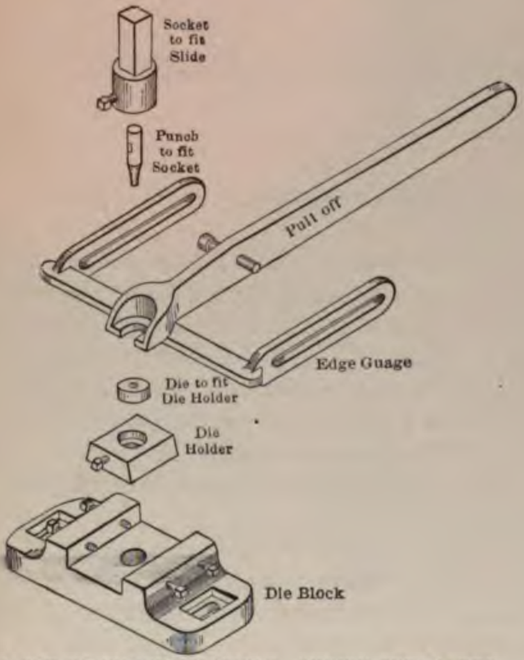
The main slide has an adjustment for wear by taper gib extending the entire length of the guide and held by a set-nut at the top. The bearing surfaces are carefully scraped to a perfect fit. Instead of the ordinary sliding block, the cam actuates the slide through the medium of an interior pintal of steel or phosphor bronze, working in bearings of steel, or phosphor bronze, in the slide, and fitted to take up all lost motion. This arrangement makes possible perfect lubrication of the wearing surfaces, and reduces their area to a minimum.

Any of the regular machines can be made double when desired, and while both sides have in such a case equal capacity to punch or shear, the throats can be equal or unequal as desired. So far as the operation of double machines is concerned, each side is perfectly independent of the other.

As shown on pages 276 and 277, any regular machine can be fitted with either punching or shearing tools, or both. Only one set of tools and blocks of either kind is regularly supplied.

These machines are usually belt-driven, but the larger sizes especially are frequently supplied with direct connected steam engines, while the operation of all sizes by direct connected electric motors is rapidly becoming popular.

The cable words given are intended to cover belt driven single machines of the styles and punching or shearing capacities shown. The depth of throat must always be cabled in addition, and in ordering by cable it should always be stated whether punching tools or cross cut or splitting shear blades are desired.



A SET OF PUNCHING TOOLS, SHOWN SEPARATED.

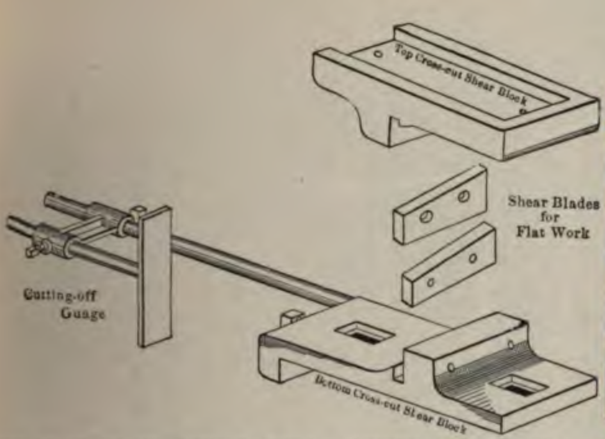
VIEW OF THROAT, SHOWING TOOLS IN POSITION, EXCEPT GAUGE.

PUNCHING TOOLS.

The Die-Block bolts to the bed jaw to receive dies or die-holders. The bolts go with it.

The Die-Holder fits the Die-Block, and is bored to receive various sizes of small dies. The die, if of small size, is circular, to fit the Die-Holder. Larger dies are the shape of the Die-Holder, and fit directly into the Die-Block. The Socket has a square shank, fitting the slide of the machine, and is bored to receive the shanks of small punches. Punches, if of small size, are round and held in the Socket. If of large size they have square shank, fitting directly into the slide in place of the Punch Socket. Kennedy or Richard's patent Punches furnished, when desired, in place of the ordinary punches. The Edge Gauge bolts to the machine frame, and its edge serves as a gauge for the edge of the piece being punched. The Pull-Off, or Stripper, is a pivoted lever, whose forward end straddles the Punch and strips the sheet as the Punch rises. Its height is adjusted for thickness of sheet by adjusting the rear end of the lever by means of a pin. One set of Punching Tools includes but one Punch and Die.

Special tools of any size and for any special variety of work can be furnished to order.


Top Cross-cut Shear Block
Shear Blades for Flat Work
Cutting-off Guage
Bottom Cross-cut Shear Block

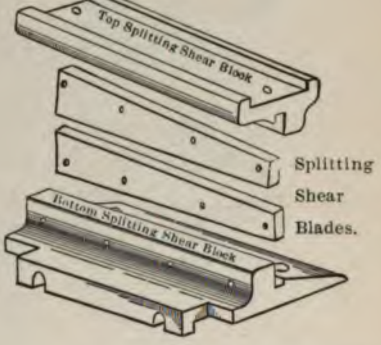
SET OF CROSS-CUT SHEAR TOOLS. SHOWN SEPARATED.

VIEW OF THROAT SHOWING TOOLS IN POSITION.

CROSS-CUT SHEARING TOOLS.

These Tools are for cutting up long work. For cutting round bars the Shear-Blades have scallops. A set of Shearing-Tools includes a pair of plain Blades and a pair of scalloped Blades. Shearing Tools can be used on either side of double machines. A Brake-Iron, not shown in cut, goes with the Tools, and keeps the bar being cut from tipping in the Shear. Any special character of cross-cut Shear can be furnished to order.

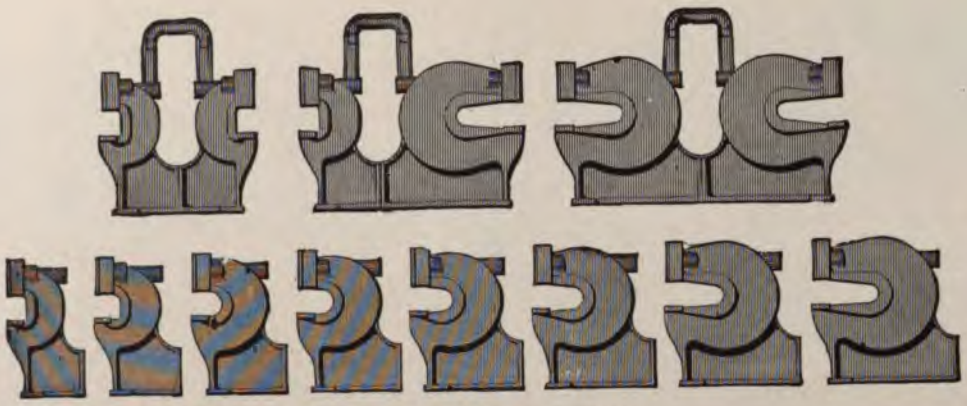
VIEW OF THROAT, SHOWING TOOLS IN POSITION.



SET OF SPLITTING SHEAR TOOLS. SHOWN SEPARATE.

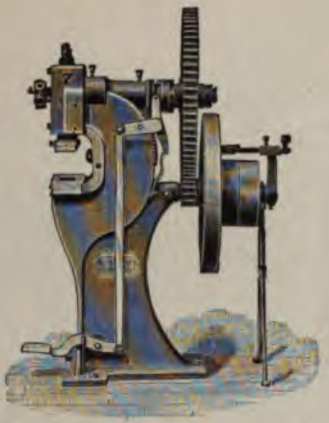
SPLITTING SHEAR TOOLS.

For cutting plates the long way. They fit on either side of double machines, and the bolts go with them. Blades are made as long as the slide of the machine is wide, so as to take a long cut each stroke.



THROAT DEPTHS.

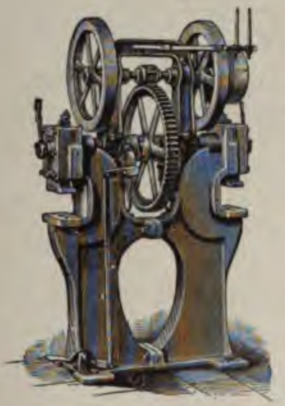
The depth of throat is the distance from the center of punch to the back wall of the throat. The above illustrations show the bodies of one size of our machine, single and double, with different throat depths. We call particular attention to the fact that we follow a regular system, and have separate, properly proportioned patterns for each different machine. We do not get the deeper throats by simply splicing the pattern, but increase the dimensions proportionately throughout the body, the only method by which proper back-stiffness can be secured in deep-throated machines.



SMALL SINGLE MACHINE.

For general purposes, punching or shearing. Made in various sizes, to punch ⅜ through ⅜ inch and below, and with throats from 3 to 16 inches deep Illustration shows machine with throats 3 inches deep.

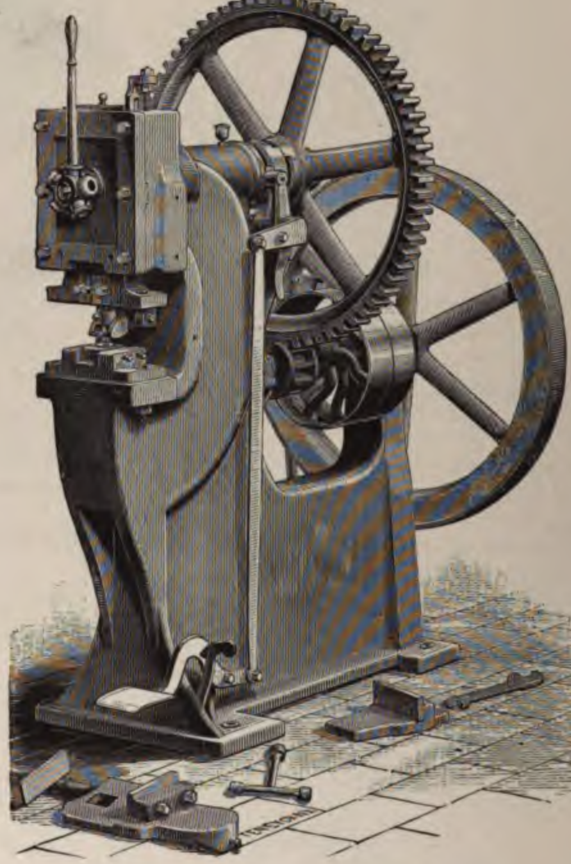
In writing state greatest diameter hole to be punched, thickness material to be punched or sheared, and depth of throat wanted.



SMALL DOUBLE MACHINE.

For general purposes, punching or shearing. Each side may be fitted for punching or shearing, and the sides operate independently like two distinct machines. Made in various sizes, for punching ⅜-inch through ⅜-inch and below and with throats alike or different, from 3 to 16 inches deep. Illustration shows machine with both throats 3 inches deep.

For Specifications see page 283.

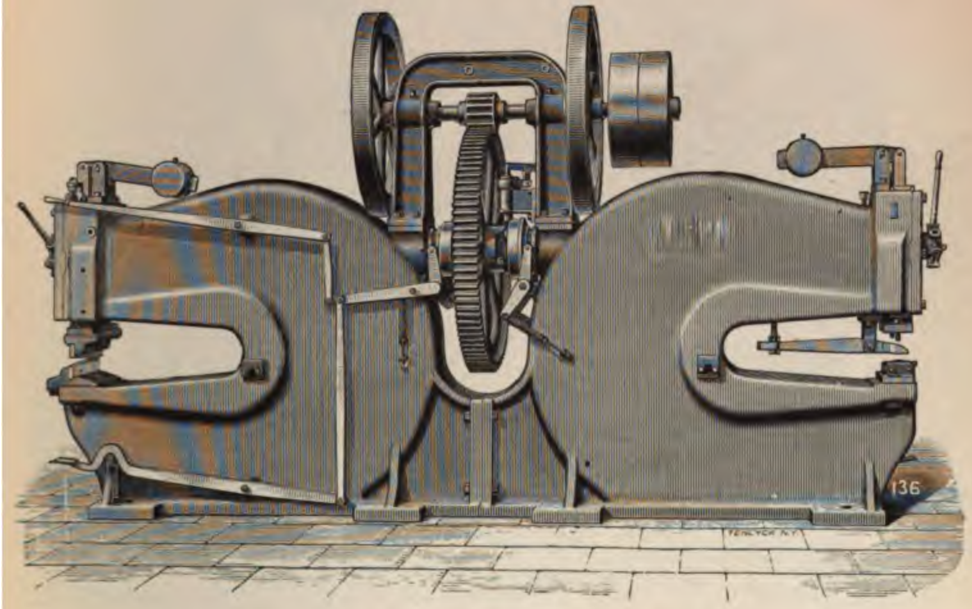


MEDIUM SINGLE MACHINE.

For general purposes, punching or shearing. Made in various sizes, to punch from ½ inch through ½ inch to ⅞ inch through ⅞ inch, and with throats from 4 to 36 inches deep. Illustration shows machine to punch ½ inch through ½ inch; throat 4 inches deep.

In writing state diameter hole to be punched, thickness of material, and throat depth.

For Specifications see page 283.

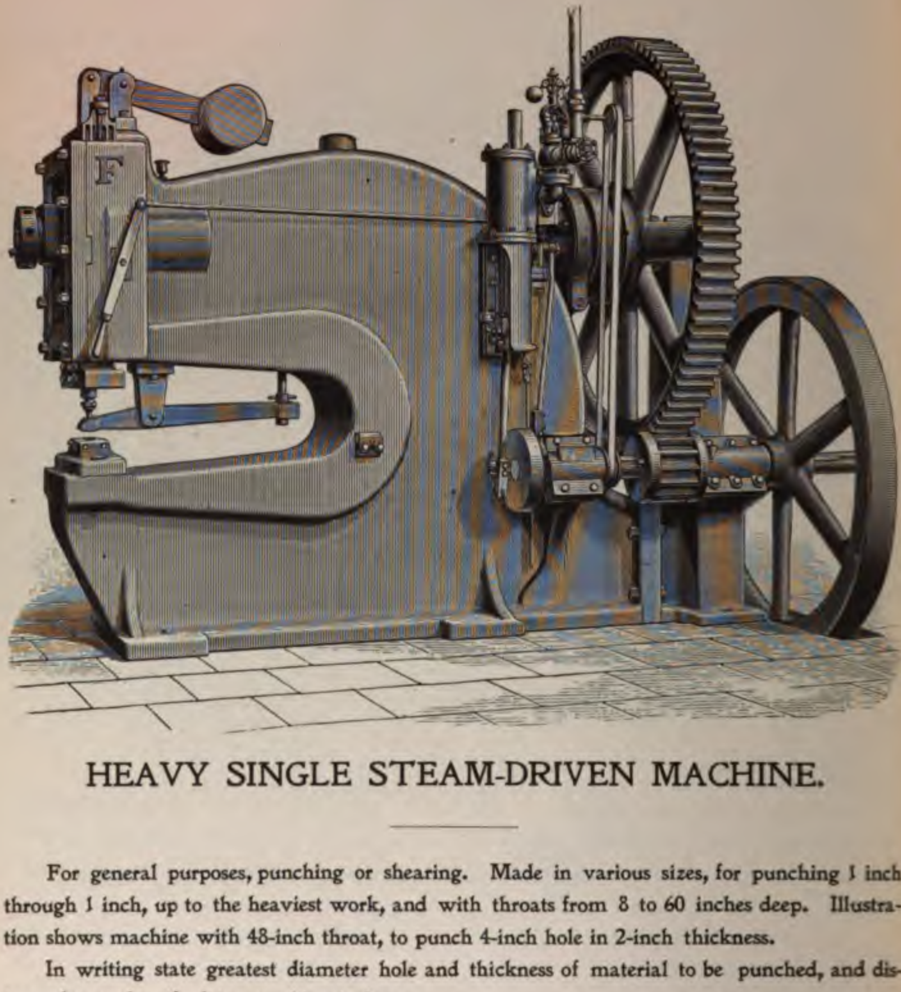


MEDIUM DOUBLE MACHINE.

For general purposes, punching or shearing. Each side may be fitted with punching or shearing tools, and each side operates independently like two separate machines. Made in various sizes, with throat depths from 8 to 48 inches deep. Illustration shows machine with 36-inch throats, one side fitted with splitting shears, and the other with punching tools.

In writing state largest hole to be punched, thickness of material to be punched or sheared, and depth of throat.

For Specifications see page 283.



HEAVY SINGLE STEAM-DRIVEN MACHINE.

For general purposes, punching or shearing. Made in various sizes, for punching 1 inch through 1 inch, up to the heaviest work, and with throats from 8 to 60 inches deep. Illustration shows machine with 48-inch throat, to punch 4-inch hole in 2-inch thickness.

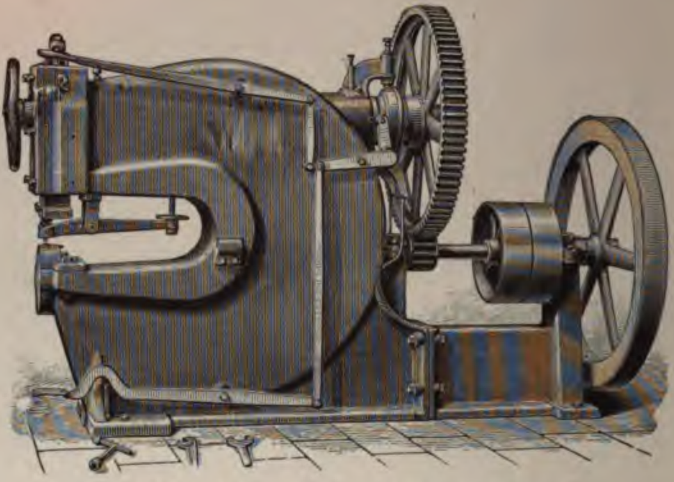
In writing state greatest diameter hole and thickness of material to be punched, and distance from edge of plate punching is done.

For Specifications see page 283.

PUNCHING AND SHEARING MACHINES.

SPECIFICATIONS OF REGULAR MACHINES.

Code Word.	No. and Style.	Will Punch.	Will Shear.		Standard Depths of Throats.	Diam. Pulleys.	Face.	Rev.
			Flat.	Round.	Inches.			
Fries......	9	¼x¼"	1½x¼"	⅝"	3 4 5 6 7 8	10"	2½"	210
Friesrock......	8	⅜x¼"	2x¼"	¾"	3 4 5 6 7 8 10	10"	2½"	210
Friesstab......	7	⅜x⅜"	2½x⅜"	⅞"	3 4 6 8 10 12 15 18	10"	3"	210
Friezes	6	½x½"	3x½"	1"	4 5 7 9 12 15 18 21 24 30	12"	3¼"	210
Frigdaria......	5	⅝x⅝"	3x⅝"	1⅛"	4 6 8 10 12 15 18 21 24 30 36 42	14"	4"	210
Frigdoris......	4	¾x¾"	4x¾"	1¼"	5 7 9 12 15 18 21 24 30 36 42 48	16"	4½"	210
Frigedinis....	3	⅞x⅞"	5x⅞"	1½"	6 8 10 12 15 18 21 24 30 36 42 48	16"	4½"	210
Frigerate......	2	1x1"	6x1"	1¾"	8 10 12 15 18 21 24 30 36 42 48 54	18"	5"	175
Frigescet......	1	1½x1"	8x1"	2"	10 15 18 21 24 30 36 42 48 54 60	24"	6"	175
Friggessi......	A	2x1⅛"	8x1⅛"	2¼"	12 15 18 21 24 30 36 42 48 54 60	30"	6¼"	175
Friggiate.....	B	2¼x1¼"	8x1¼"	2½"	12 15 18 21 24 30 36 42 48 54 60	30"	6¼"	175
Friggo..........	C	2½x1½"	8x1½"	3"	12 15 18 21 24 30 36 42 48 54 60 66	30"	7¼"	175
Frighten	D	3x1¾"	10x1¾"	3½"	12 15 18 21 24 30 36 42 48 54 60 66	30"	7¼"	175
Frightful.. ...	E	4x1¾"	10x2"	4"	12 15 18 21 24 30 36 42 48 54 60 66	36"	8¼"	175
Frigidato......	F	4x2"	12x2½"	4½"	12 15 18 21 24 30 36 42 48 54 60 66 72	36"	8¼"	150
Frigidite.	G	5x2"	12x2¾"	5"	12 15 18 21 24 30 36 42 48 54 60 66 72	40"	8¼"	150
Frigidly........	H	6x2"	12x3"	6"	12 15 18 21 24 30 36 42 48 54 60 66 72	40"	8¼"	150



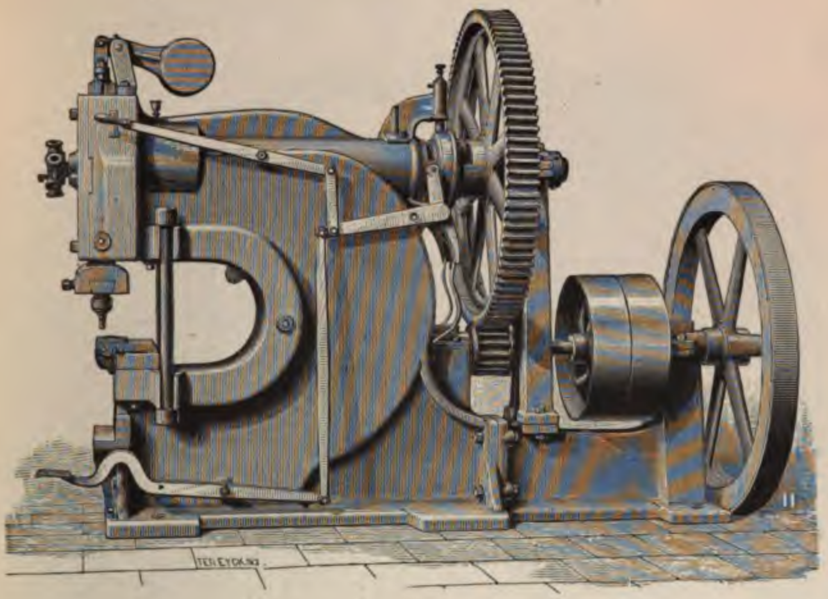
SINGLE BOILER PUNCH.

Made regularly in seven sizes, to punch from ⅝ inch through ⅜ inch to the heaviest marine boiler work, and with throats from 15 to 60 inches deep. Lower jaw is in beak form, so punching can be done close in the corner of flanges. Punching tools shift further inward for punching tube hole and hand holes. Can be used for shearing by removing the punching tools and attaching shears.

In writing state largest hole and thickest material to be punched, heaviest shearing and depth of throat.

Code word for type, Frigidorum.

(Use this code word in connection with code word for capacity taken from the table on page 283).



HEAVY I BEAM PUNCHING MACHINE.

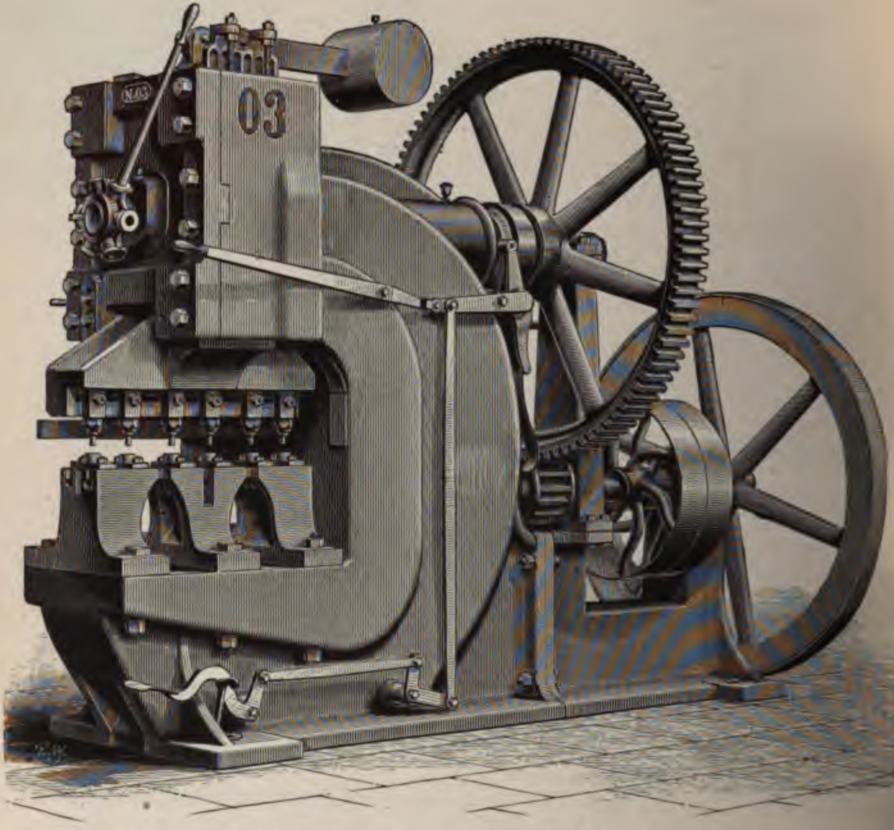
This illustration shows a machine for punching the flanges of I beams, one hole at a time or doing work of a similar nature.

The lower jaw is set back so that the die block overhangs and the beam to be punched can pass along the front of the machine with the flange resting on the die. A supplemental block is furnished with which to extend the lower jaw to its regular form for ordinary punching.

Can furnish in different sizes with or without steam engine.

SPECIFICATIONS.

Code Word Belt Driven.	Code Word Engine Driven.	Style	Punch and Cope Beams.	Standard Depths of Throat, Inches.	Diam. Pulleys.	Face.	Revs.	Weight	Price.
Fringeless..	Froehlich...	A	12″	15 18 21 24	30″	6¼″	175	$........	....
Fringilago.	Froehnen...	B	15″	15 18 21 24	30″	6¼″	175	$..	....
Fringillis..	Froehnerei.	C	20″	18 21 24 30	30″	7¼″	175	$........	....
Fringillum	Froemmer..	D	24″	18 21 24 30	30″	7⅛″	175	$........	....
Fringnagel	Froemmling	E	28″	18 21 24 30	36″	8¼″	175	$...	....
Fringuella.	Froere........	F	30″	18 21 24 30	36″	8¼″	175	$........	....



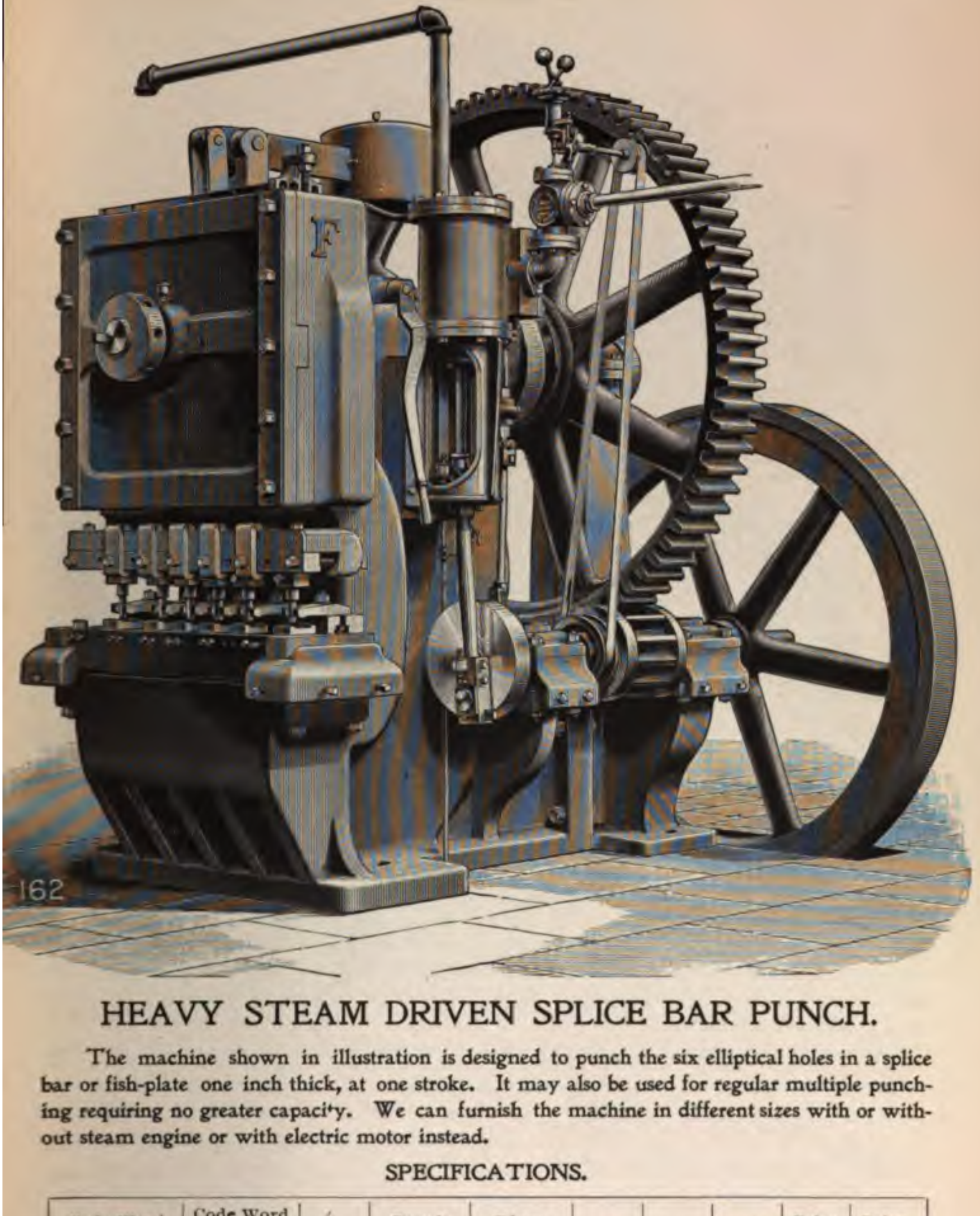
HEAVY MULTIPLE AND I BEAM PUNCH.

The machine shown in this illustration is designed for bridge and girder work and will punch one or more holes in the flanges of one or two I beams, any depth from 12 to 20 inches at one stroke.

It can also be used for ordinary flat punching without removing the special die blocks. The illustration shows the machine fitted with six punches in a row for punching the cross rows in girder plates. We can furnish the same with steam engine which makes it independent of shafting and belting.

Code word for type, Belt Driven, Frisotte.

Code word for type, Engine Driven, Frisquet.



HEAVY STEAM DRIVEN SPLICE BAR PUNCH.

The machine shown in illustration is designed to punch the six elliptical holes in a splice bar or fish-plate one inch thick, at one stroke. It may also be used for regular multiple punching requiring no greater capacity. We can furnish the machine in different sizes with or without steam engine or with electric motor instead.

SPECIFICATIONS.

Code Word Belt Driven.	Code Word Engine Driven.	Style.	Punch Holes.	Diam. Pulleys.	Face.	Rev.	Weight	Price Belt.	Price Steam.
Frohnwald...	Froler.	A	4– ½″	30″	6¼″	175	....	$........	$........
Frohnzins.....	Frolicful...	B	4– ⅝″	30″	6¼″	175	....	$........	$........
Frohsinn	Frolicking.,	C	4– ¾″	30″	7¼″	175	....	$........	$........
Froisses........	Frolicsome.	D	4– ⅞″	30″	7¼″	175	....	$........	$........
Froissais	Froliez.......	E	6– ⅞″	36″	8¼″	175	....	$........	$........
Froisseur......	Frolions.....	F	6–1″	36″	8¼″	175	....	$........	$........
Frolado.........	Frolovie....	G	6–1⅛″	40″	8¼″	175	....	$........	$........
Frolenca.......	Frolyes	H	6–1¼″	40″	8¼″	175	....	$........	$........

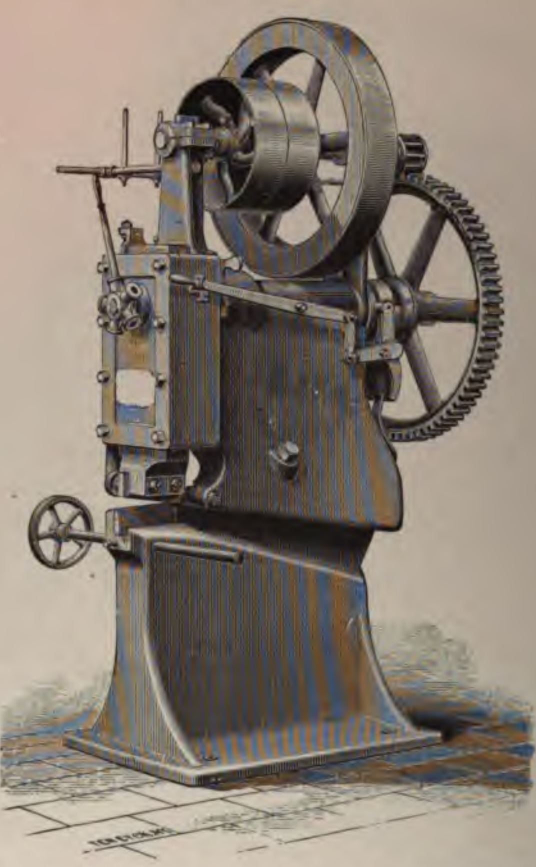


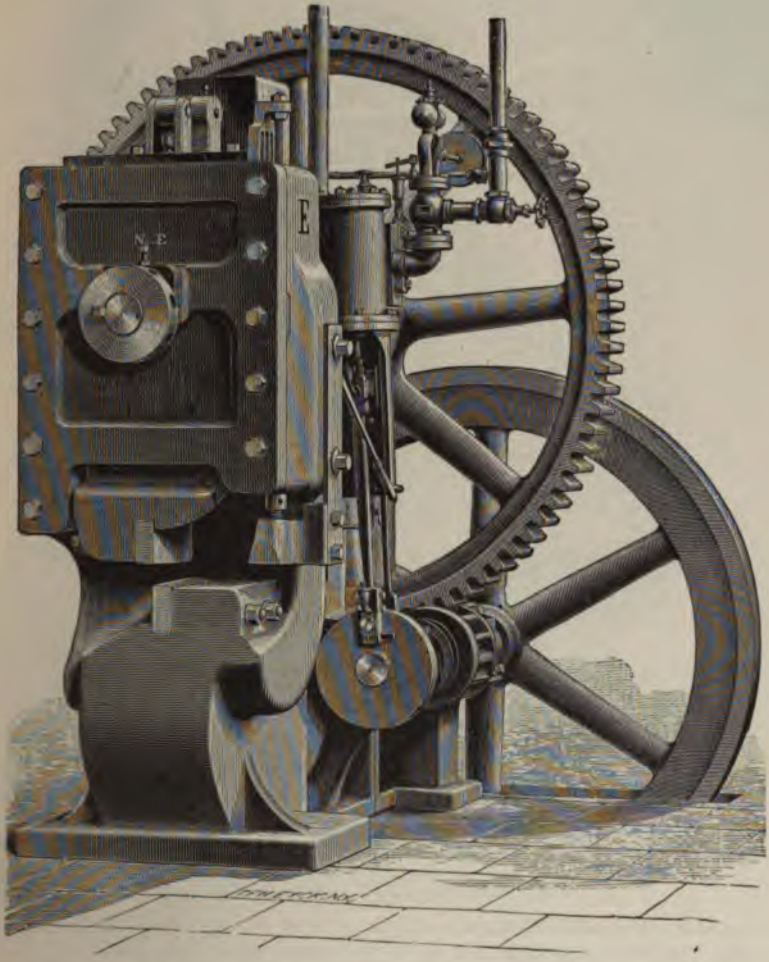
PLATE SPLITTING AND CROSS-CUTTING SHEAR.

For cutting in two large sheets and plates. The shear-blades set paralel with the body, and the body has double off-set above and below, which the cut edges of the sheet pass, so the blades can cut sheets of any length and width. The illustration shows machine for cutting ½ inch thick. Made in different sizes.

In writing state greatest thickness of material to be sheared.

SPECIFICATIONS.

Code Word.	No. and Style.	Cuts Plates.	Length Blades.	Diam. Pulleys.	Face.	Rev.	Weight.	Price.
Fringant.......	4	½''	8½''	16''	4¾''	210	....	$..........
Fringille......	3	⅝''	10''	16''	4¾''	210	....	$..........
Fringuer.......	2	¾''	12½''	18''	5¼''	175	....	$..........
Friniates.....	1	⅞''	16''	20''	5¾''	175	....	$..........
Frinio..........	A	1''	18''	30''	6¼''	175	....	$..........
Frinire..........	B	1⅛''	20''	30''	6¼''	175	....	$..........
Friniva.........	C	1¼''	22''	30''	7¼''	175	....	$..........
Frioulan........	D	1½''	24''	30''	7¼''	175	....	$..........



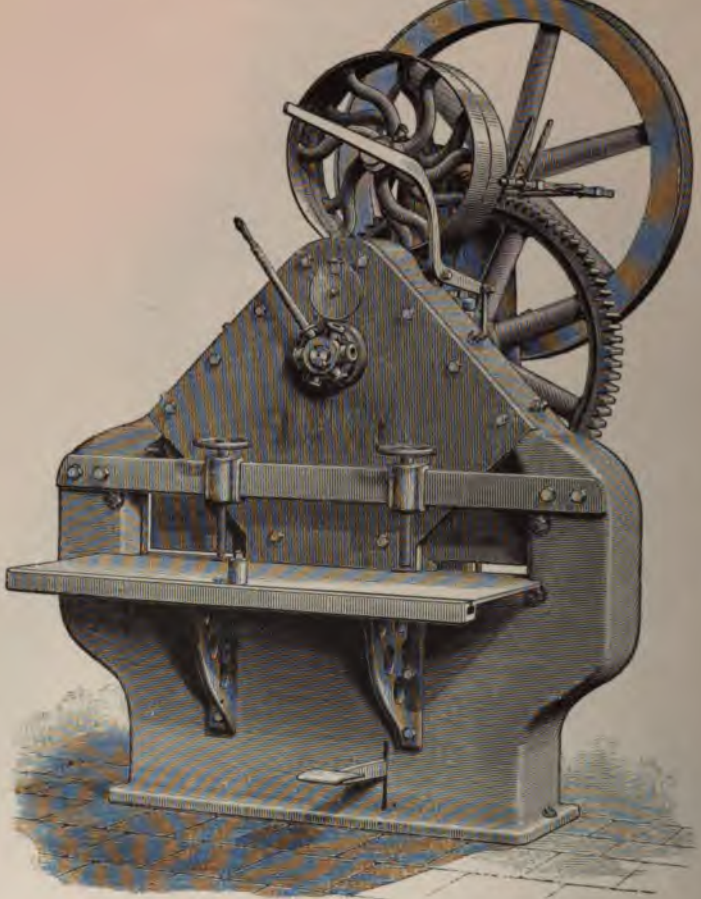
SINGLE HEAVY STEAM-DRIVEN CROSS-CUT SHEAR.

For cutting off square, round, or flat bar iron or steel. Made in various sizes. Machine illustrated cuts off cold, 4-inch square iron, and 3-inch square tool steel, or flat bar of equal cross-section area.

In writing state sizes and shape of heaviest bar to be cut off.

Code Work for type, Fritillary.

To be used in connection with code word for capacity taken from table on page 283.



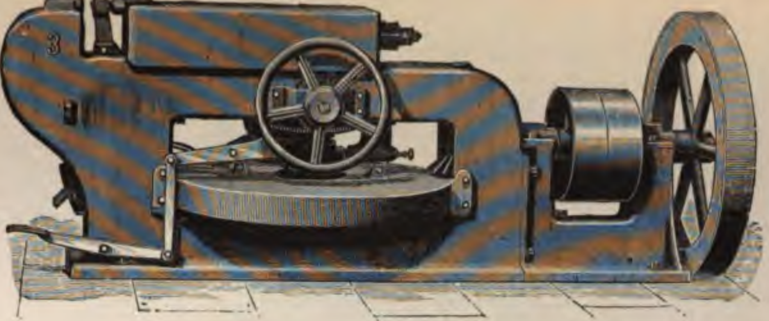
ANGLE-IRON SHEAR.

For shearing angle iron, squarely or at miters or other angles, either right or left hand. Made in nine sizes, for cutting angle iron up to the largest sizes. Has iron table, adjustable gauge, holding clamps.

In writing give dimensions of largest angle to be sheared.

SPECIFICATIONS.

Code Word.	No.	Will Shear.	Diam. Pulleys.	Face.	Rev.	Weight.	Price.
Fripais	4	3"x3"x¼"	16"	4¾"	210	....	$............
Friper	3	4"x4"x⅜"	18"	5¼"	21	....	$............
Fripiez	2	5"x5"x½"	18"	5¼"	175	....	$............
Fripons	1	6"x6"x¾"	24"	5¼"	175	....	$............
Frisado	A	6"x6"x 1"	20"	5¾"	210	....	$............
Frisant	B	7"x7"x¾"	24"	6¼"	280	....	$............
Friscello	C	8"x8"x¾"	28"	6¼"	280	....	$............
Frisch	D	9"x9"x⅞"	28"	6¼"	280	....	$............
Frischen	E	9"x9"x 1"	3 "	6¼"	280	....	$............



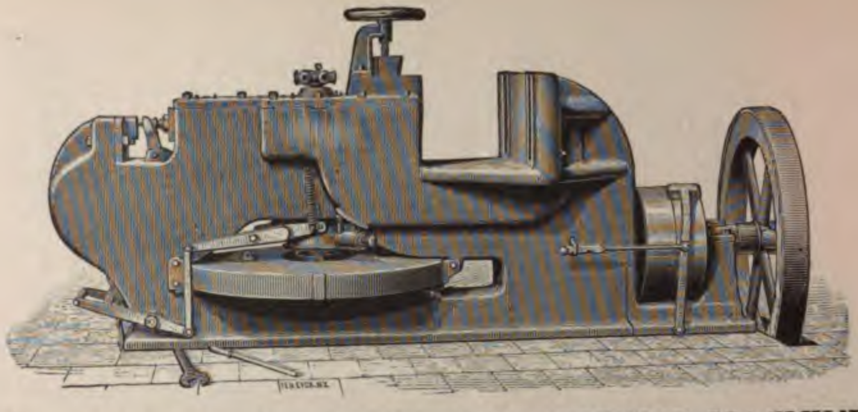
HORIZONTAL PUNCH.

Punch is located at top of jaw, so will work close in corners of flanged work, etc. Has hand-wheel for working ram by hand. Made regularly in five sizes, to punch from ¾-inch to 1½ inches through 1½ inches thickness. Can furnish any desired depth of throat. Illustration shows machine to punch ⅞-inch through ⅞-inch, with throat 6 inches deep. Has automatic stop.

In writing state largest diameter hole and greatest thickness of material to be punched, and throat depth.

SPECIFICATIONS.

Code Word.	Number and Style.	Hole in Plate.	Standard Depths of Throat, Inches.	Diam. Pulleys.	Face.	Revs.	Weight.	Price.
Frigios..........	4	¾x ¾″	5 7 9	16″	4½″	175 to 210	....	$....... ......
Frigoris........	3	⅞x ⅞″	6 8 10 12	16″	4½″	175 to 210	....	$....... ......
Frigoule.......	2	1x1″	7 9 12 15 18	18″	5″	175 to 210	....	$....... ......
Frigousse......	1	1½x1″	7 9 12 15 18	24″	6¼″	175	....	$. ....
Friguttias.....	A	2x1⅛″	8 10 12 15 18 21	30″	6¼″	175	....	$....... ......
Frileux	B	2¼x1¼″	8 10 12 15 18 21 24	30″	6¼″	175	....	$....... ......
Frimousser...	C	2½x1⅜″	8 10 12 15 18 21 24 30	30″	7¼″	175	....	$....... ......
Fringale......	D	3x1¾″	8 10 12 15 18 21 24 30	30″	7¼″	175	....	$....... ......

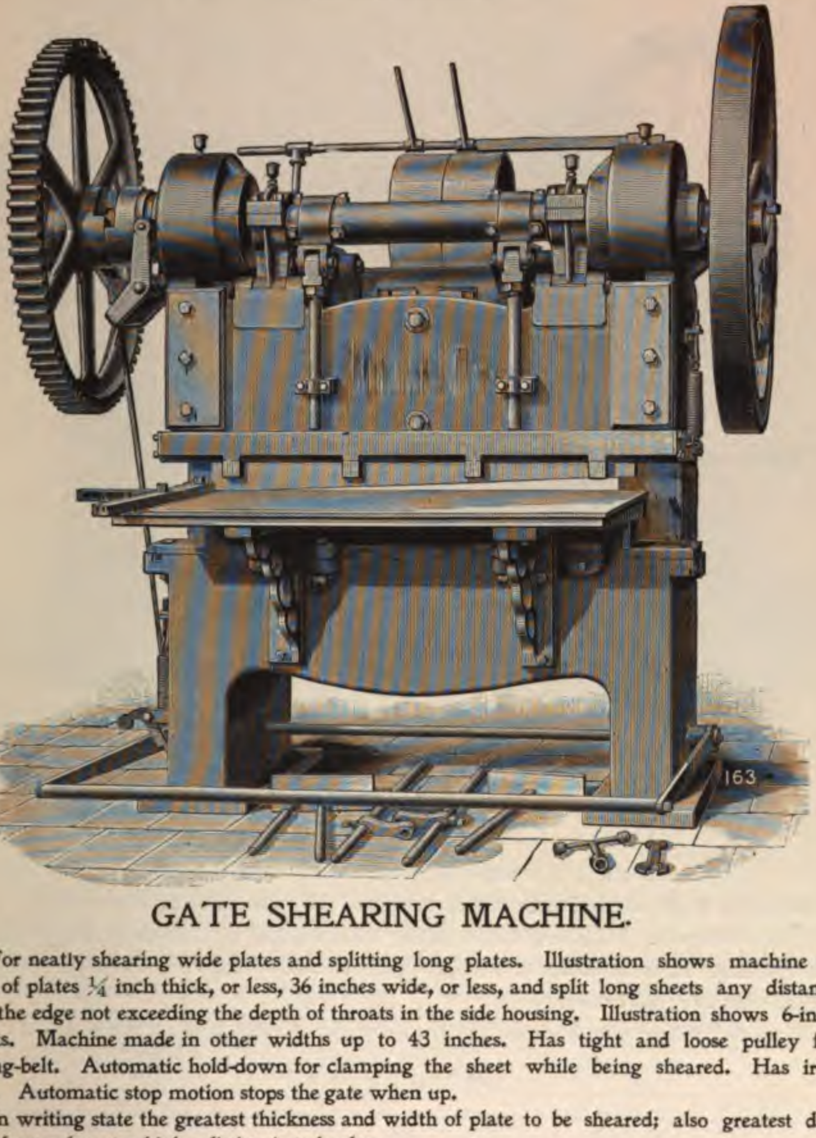


HORIZONTAL PUNCHING AND BENDING MACHINE.

For punching and straightening beams for bridge and girder work; will punch close in the corner of flanges. The machine shown in illustration will punch a 1-inch hole through 1-inch iron or straighten a 15-inch beam, but these machines are made in five different sizes. The straightening die is adjustable while the machine is in operation. The depth of the throat on the punch end is 6 inches; it controls the distance from the edge of the plate or beam at which punching can be done, but does not affect the capacity in any other way.

SPECIFICATIONS.

Code Word.	No.	Bend Beams.	Hole in Plate.	Standard Depths of Throat. Inches.	Diam. Pulleys.	Face.	Rev.	Weight.	Price.
Frigorabat...	4	8″	¾x¾″	5 7 9	16″	4½″	210	....	$..................
Frigorabis...	3	10″	⅞x⅞″	6 8 10 12	16″	4½″	210	....	$..................
Frigoravi.....	2	12″	1x1″	7 9 12 15 18	18″	5″	175	....	$..................
Frigorific......	1	15″	1⅛x1″	7 9 12 15 18	24″	6″	175	....	$..................
Frilinge.......	A	18″	2x1⅛″	8 10 12 15 18 21	30″	6¼″	175	....	$..................
Frimaire.......	B	20″	2x1¼″	8 10 12 15 18 21 24 30	30″	6¼″	175	....	$..................
Frincha.......	C	20″	2½x1½″	8 10 12 15 18 21 24 30	30″	7¼″	175	....	$..................
Frinfino......	D	24″	3x1½″	8 10 12 15 18 21 24 30	30″	7¼″	175	....	$..................



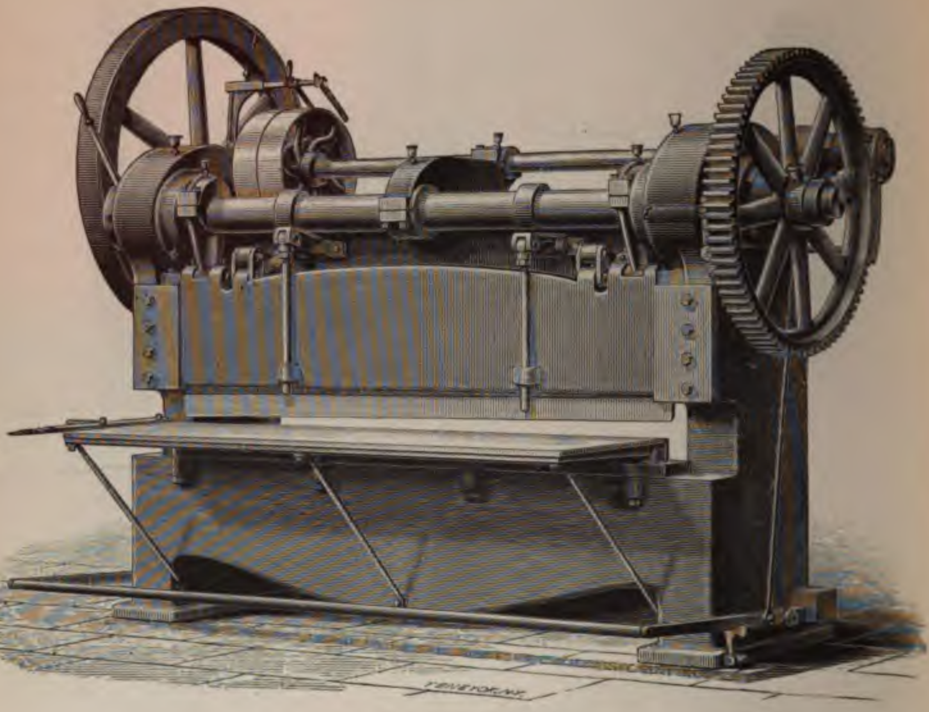
GATE SHEARING MACHINE.

For neatly shearing wide plates and splitting long plates. Illustration shows machine to shear of plates ¼ inch thick, or less, 36 inches wide, or less, and split long sheets any distance from the edge not exceeding the depth of throats in the side housing. Illustration shows 6-inch throats. Machine made in other widths up to 43 inches. Has tight and loose pulley for driving-belt. Automatic hold-down for clamping the sheet while being sheared. Has iron table. Automatic stop motion stops the gate when up.

In writing state the greatest thickness and width of plate to be sheared; also greatest distance from edge at which splitting is to be done.

SPECIFICATIONS.

Code Word.	No.	Shear Plates.	Width Between Housings. Inches.	Diam. Pulleys.	Face.	Rev.
Frixerat...	4	⅛"	24 30 36 42 48 54	16"	4½"	175
Frixisti...	3	3/16"	24 30 36 42 48 54 60	16"	4½"	175
Frizada...	2	⅜"	24 30 36 42 48 54 60 66 72 78 84 90 96	18"	5¼"	175
Frizz........	1	½"	24 30 36 42 48 54 60 66 72 78 84 90 96	24"	6¼"	175



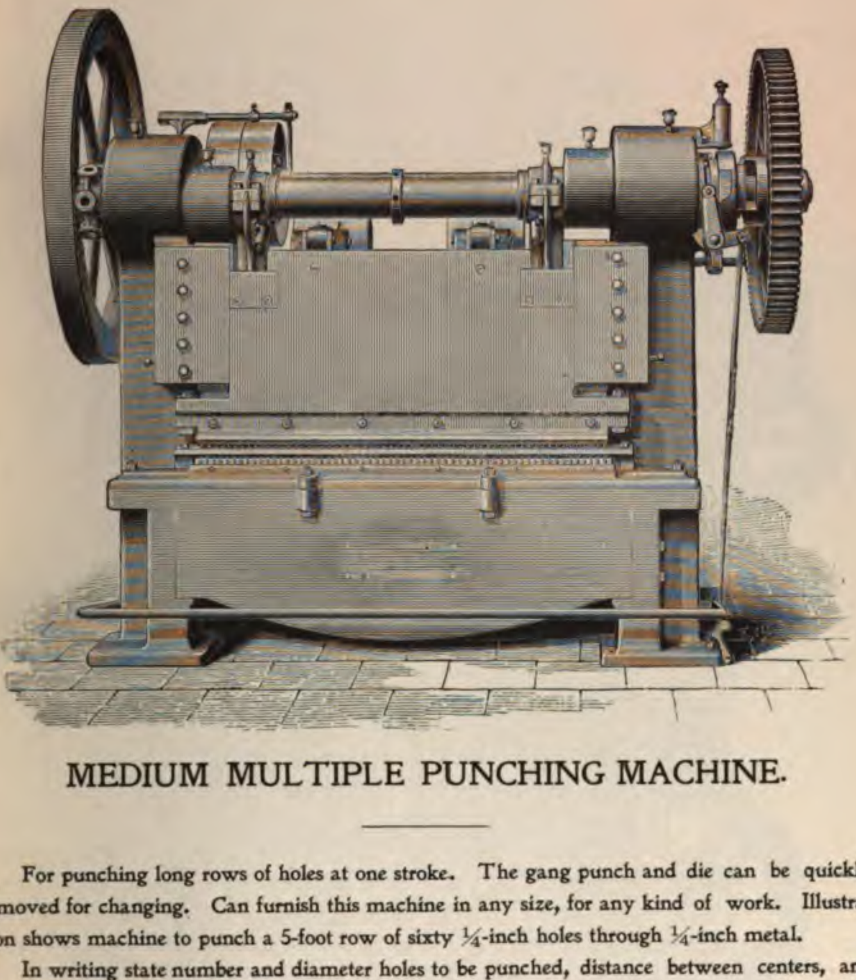
HEAVY GATE SHEAR.

For neatly shearing and trimming flat plates. Has iron table, gauge, etc. The housings are throated so sheets of any length can be trimmed. Has automatic hold-down to clamp the sheet while being cut. Made any size, to cut any thickness, and with different throat depths for wide splitting. Illustration shows machine with 86-inch blades and 6-inch throat. This machine may have belt or steam drive.

In writing state greatest thickness and greatest width of sheet to be cut at one stroke.

SPECIFICATIONS.

Code Word.	Style.	Shear Plates.	Widths Between Housiugs. Inches.	Diam. Pulleys.	Face.	Rev.
Frizzly.....	A	⅝″	24 30 36 42 48 54 60 66 72 78 84 90 96	30″	6¼″	300
Froberge..	B	¾″	24 30 36 42 48 54 60 66 72 78 84 90 96	30″	6¼″	250
Frocard ..	C	⅞″	24 30 36 42 48 54 60 66 72 78 84 90 96 102	30″	7¼″	250
Frochot ..	D	1″	24 30 36 42 48 54 60 66 72 78 84 90 96 102	30″	7¼″	200
Frocks	E	1⅛″	24 30 36 42 48 54 60 66 72 78 84 90 96 108	36″	8¼″	200
Frodasse..	F	1¼″	24 30 36 42 48 54 60 66 72 78 84 90 96 108 120	36″	8¼″	200
Froebel ...	G	1½″	24 30 36 42 48 54 60 66 72 27 84 90 96 108 120	40″	8¼″	200



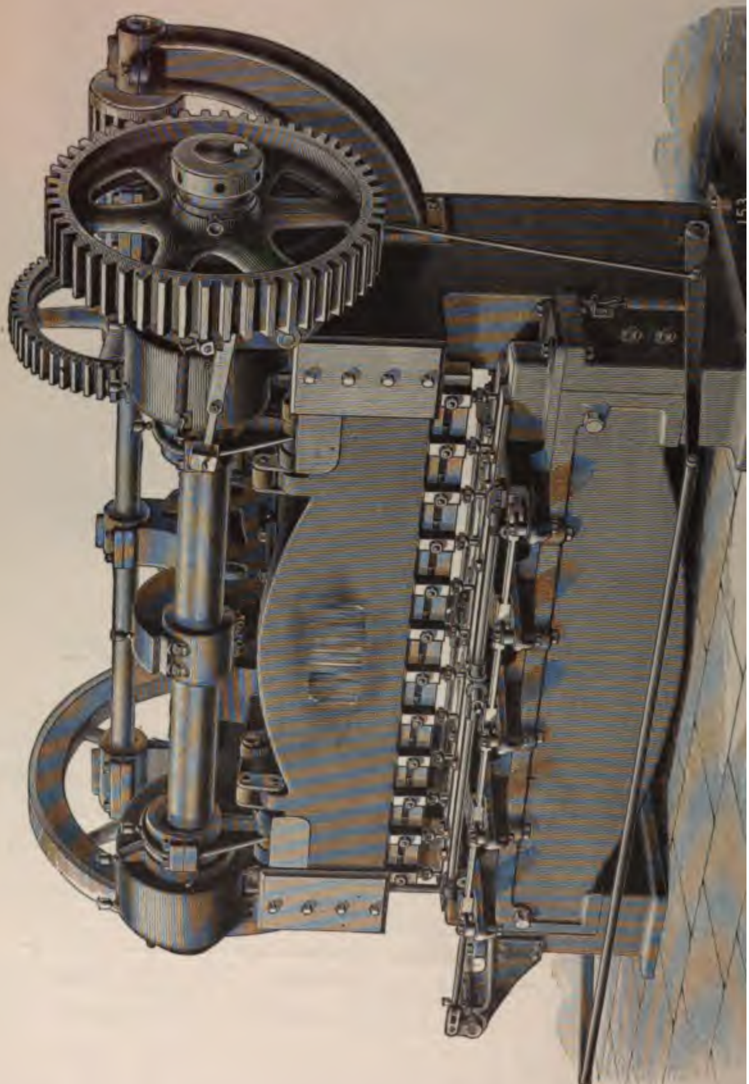
MEDIUM MULTIPLE PUNCHING MACHINE.

For punching long rows of holes at one stroke. The gang punch and die can be quickly removed for changing. Can furnish this machine in any size, for any kind of work. Illustration shows machine to punch a 5-foot row of sixty ¼-inch holes through ¼-inch metal.

In writing state number and diameter holes to be punched, distance between centers, and thickness of material.

SPECIFICATIONS.

Code Word.	No.	Depth Throat	Distance Between Housings. Inches.	Diam. Pulleys.	Face.	Rev.
Friskal....	4	6″	18 24 30 36 42 48 54 60	16″	4½″	175
Frislet....	3	6″	24 30 36 42 48 54 60 66	16″	4½″	175
Frisson....	2	6″	24 30 36 42 48 54 60 66 72	18″	5″	175
Fristen	1	6″	24 30 36 42 48 54 60 66 72 78 84	24″	6″	175


153

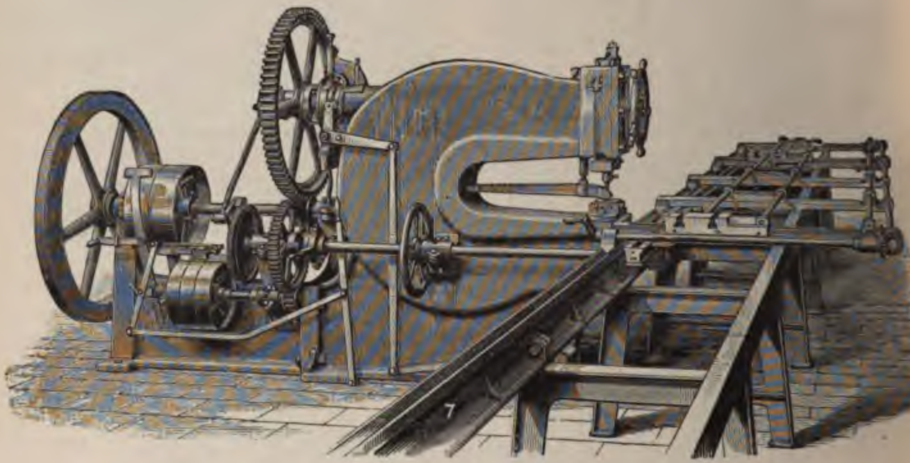
HEAVY MULTIPLE PUNCHING MACHINES.

To punch at one stroke a row of holes at adjustable distance apart, and to straighten the metal edgewise at the time of punching. Made in various sizes. Illustration shows machine to punch twelve ¾-inch holes through ¾-inch metal, 6 inches between centers, or to do any similar punching requiring equal capacity. Will punch to the center of strips any length and 12 inches wide. Punches and dies readily adjustable for distance between holes. Grippers clamp the strip edgewise and straighten it, holding it while being punched. We make machines with same punching capacity, but varying in length of slide and throat depth.

In writing give full particulars of work to be done, number and greatest diameter holes to be punched, distance between centers, greatest thickness of metal, etc.

SPECIFICATIONS.

Code Word.	Style.	Depth Throat.	Distance Between Housings. Inches.	Diam. Pulleys.	Face.	Rev.
Frithly.	A	6″	24 30 36 42 48 54 60 66 72 78 84 90 96	30″	6¼″	300
Frittage	B	6″	24 30 36 42 48 54 60 66 72 78 84 90 96 102 108	30″	6¼″	250
Frittende	C	6″	24 30 36 42 48 54 60 66 72 78 84 90 96 102 108 114 120	3 ″	7¼″	250
Friturier.......	D	6″	24 30 36 42 48 54 60 66 72 78 84 96 102 108 114 120 132	30″	7¼″	200
Frivole	E	6″	24 30 36 42 48 54 60 66 72 78 84 96 102 108 114 120 132 144	36″	8¼″	200
Frivolite.......	F	7″	24 30 36 42 48 54 60 66 72 78 84 96 102 108 114 120 132 144 150	36″	8¼″	200
Frivolous......	G	8″	24 30 36 42 48 54 60 66 72 78 84 96 102 108 114 120 142 144 150	40″	8¼″	200



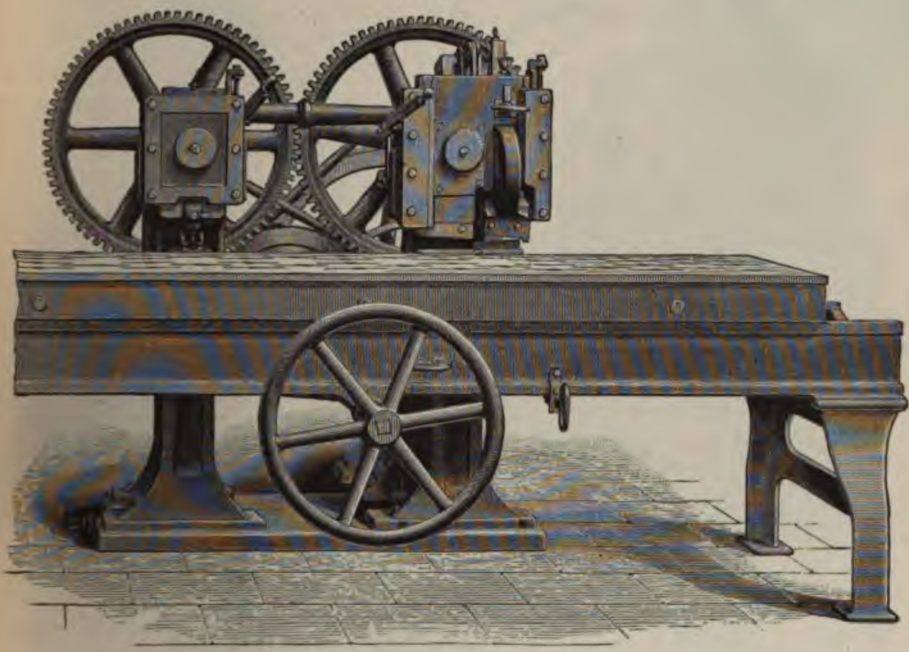
MEDIUM SINGLE AUTOMATIC SPACING MACHINE.

For punching holes in series. Sheet bolts on feed table and is fed automatically, accurately spacing and punching the holes, one at a time. Spacing is adjustable. Table has quick traverse motion in addition to the feeding motion. Can furnish any size desired, with solid or skeleton table. Illustration shows machine with 24-inch throat and skeleton table, for light or medium work. Can furnish any throat depth.

In writing state diameter hole and thickness of material to be punched, distance between holes for spacing, and throat depth, with length of table necessary.

Code Word for type, Frixabas.

To be used in connection with code word for capacity taken from table on page 283.



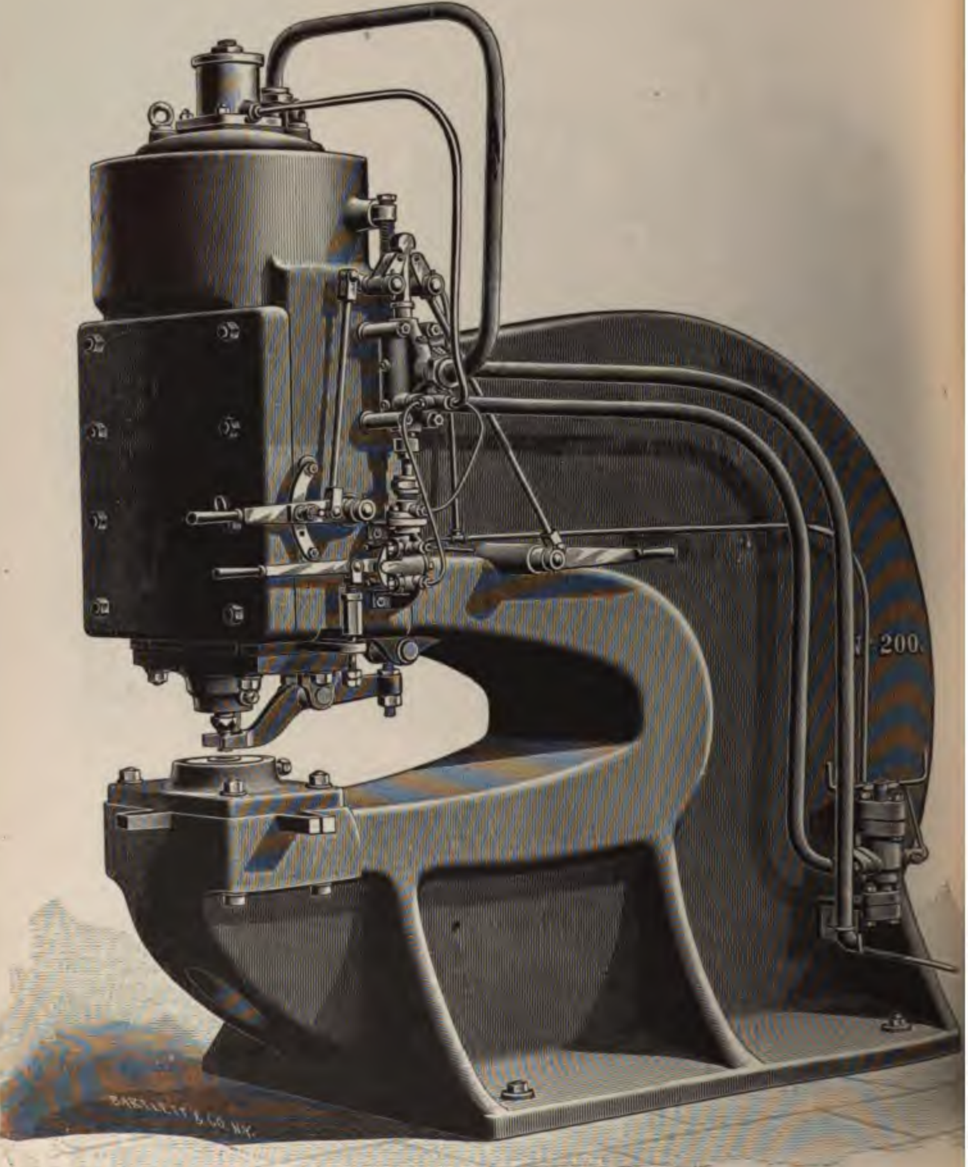
AUTOMATIC TRIMMER, BEVELER, SPACER, AND PUNCH.

To trim, bevel, space, and punch the holes in boiler and other platework. Sheet fastened to table and fed past the tools, which trim and bevel the edge, and automatically space and punch the holes. Spacing is adjustable. Table has quick hand-motion in addition to the power-feed motion. Made in any size desired, with either hand or power feed.

In writing state diameter hole to be punched, thickness of material to be punched and trimmed, and whether hand or power feed.

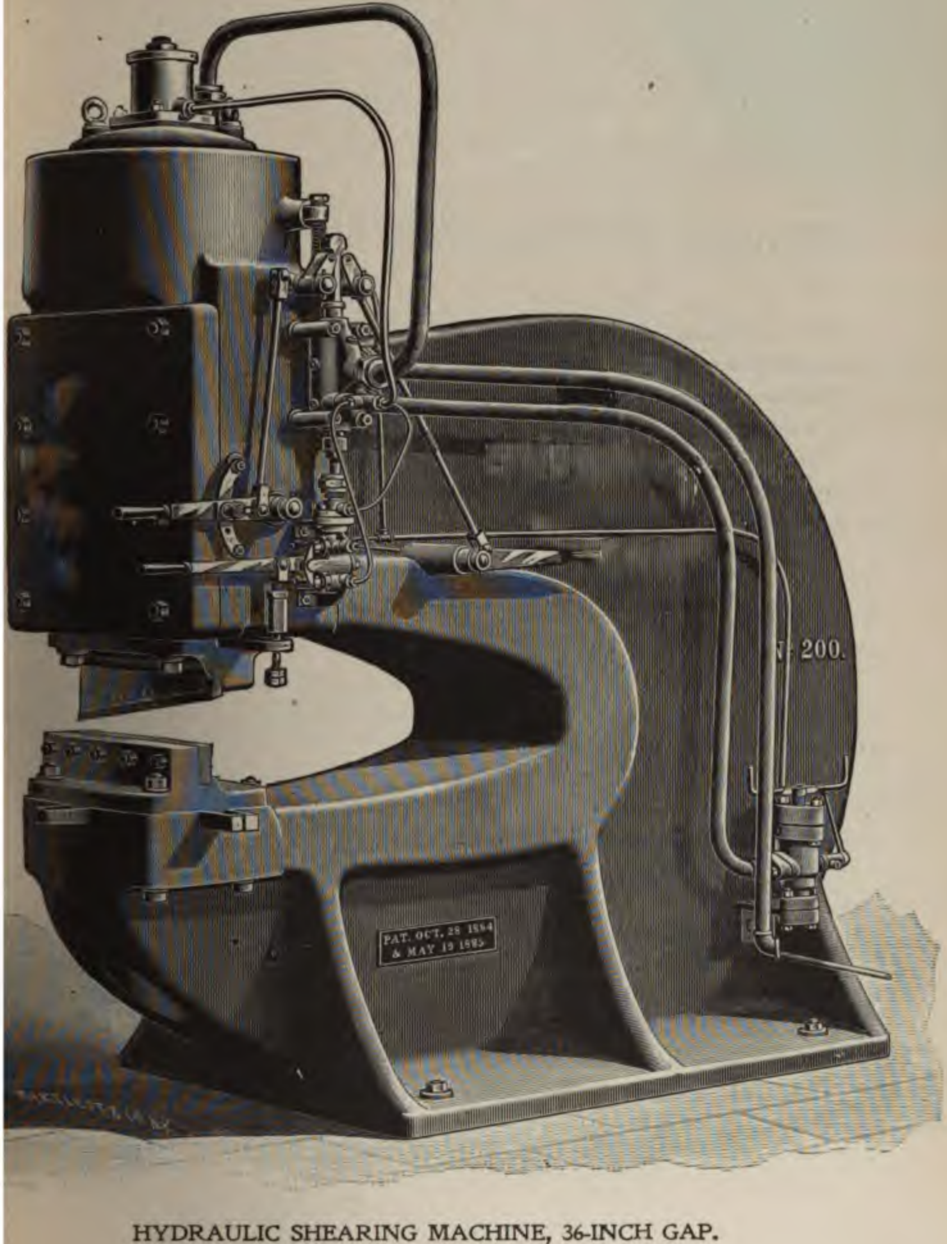
Code Word for type, hand feed, Frixabitis.

Code Word for type, power feed, Frixantes.



HYDRAULIC PUNCHING MACHINE, 36-INCH GAP.

For Description see page 302.



HYDRAULIC SHEARING MACHINE, 36-INCH GAP.

For Description see page 302.

POWER BENDING ROLLS.

We are frequently asked for prices on bending rolls where the width of the sheet only is specified. The thickness of plate is also an important factor, as also the diameter of the circle to which it must be bent.

We make four different styles of bending rolls, suited to different widths and thickness of plates.

In the first style the machine consists of three rolls. Two of these are placed one over the other and are geared together. The lower roll is adjustable for plates of different thickness. The bending roll is placed at the back and is moved in inclines in the housings. Both ends are raised and lowered by power at the same time, but one end is adjustable independently of the other.

In this arrangement the initial rolls being geared together, pinch the sheet tightly and carry it through without slippage.

One bearing of the upper roll is movable, and may be thrown back to remove flue rings.

We recommend this form of rolls as most desirable for bending light boiler plate and tank iron, but the adjustability of the feeding rolls for different thickness of plate must be small on account of their being geared together.

In the second style of construction, which we employ for the wider and heavier range of plates, the machine consists of three rolls placed in pyramid form, with the two lower rolls geared together, and the bending roll on top, which runs by friction.

The upper roll is raised and lowered by power to suit the thickness of plate or diameter of bend. It is operated in the same manner as the back roll in the first style.

In this construction, also, one bearing of the upper roll is movable to permit the removal of rings.

This form of rolls is preferable for wide plates of medium thickness. The stiffness of the plate is generally sufficient to drive the upper roll.

For bending the heaviest class of plates, such as are used in ship building, we recommend the use of four rolls. In this construction two rolls are placed one over the other, are adjustable by power for thickness of plate and both are driven. The bending rolls are placed one on each side, and move in inclined ways in the housings. They will curve the sheet almost to the edge, leaving only a short straight end.

In the fourth style of construction the machine is provided with three rolls placed in a vertical position. The arrangement of the rolls is the same as in the pyramid type except their position is vertical instead of horizontal.

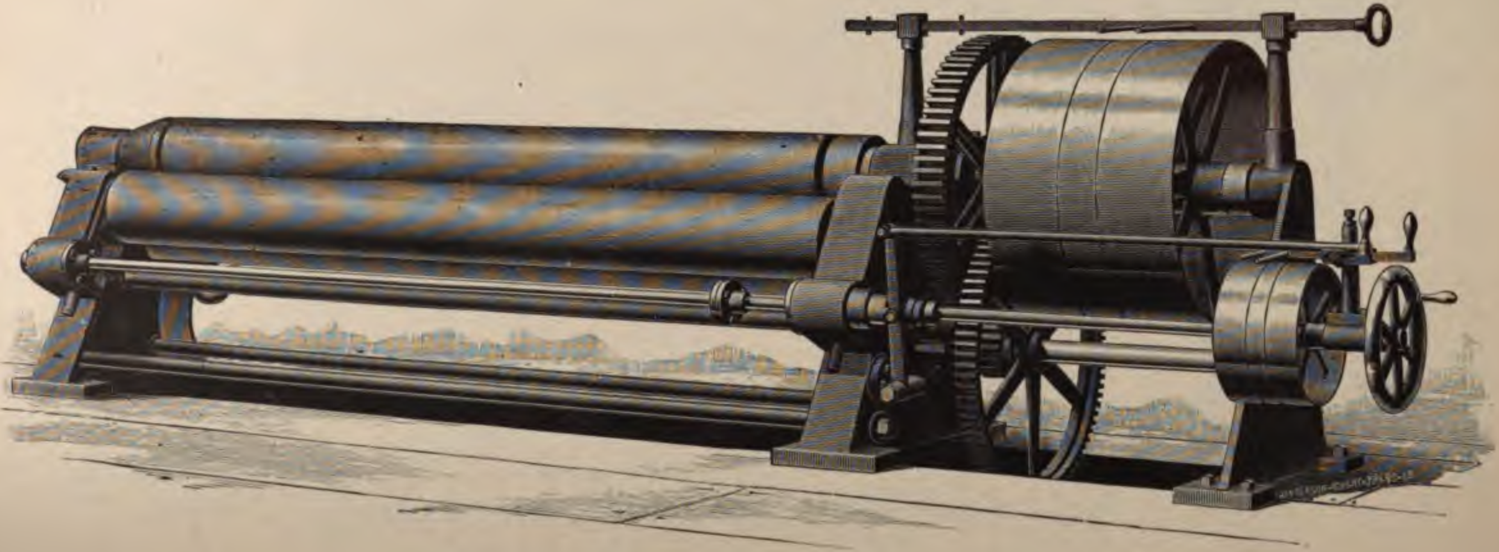
A machine so constructed possesses some features of advantage worthy of consideration in bending armor plates. It takes up comparatively small space and all the driving gear is below the floor line, leaving front of machine entirely unobstructed. The bending roll may be hoisted full height when the plate is to be taken off.

Machines are built to drive by belt, or can be adapted for engines or electric motors, as preferred. Countershafts furnished when necessary.

POWER BENDING ROLLS.

TABLE OF SIZES AND CODE WORDS.

rd. Com- ut Rolls	Code Word. Machine Complete, With Rolls	Name of Machine.	Length of Plate.	Thickness of Plate.	Weight of Machine Without Rolls.	Weight of Machine Complete With Rolls	Price Without Rolls.	Price Complete With Rolls.
......	Neat	No. 2	48″	5/16″	......	......	$......	$......
......	Neatified	No. 2	60″	1/4″	......	......	$......	$......
......	Neckcloth	No 3	6′	3/8″	......	......	$......	$......
.....	Necklace	No. 3	8′	3/8″	......	......	$......	$......
.....	Necktie	No. 3	10′	3/8″	......	......	$......	$......
......	Nectarine	No. 4	10′	5/8″	......	......	$......	$......
......	Nefarious	No. 4	12′	5/8″	......	......	......	$......
....	Nuptial	No. 4½	8′	1/2″	......	......	$......	$......
......	Nurse	No. 4½	10′	3/8″	......	......	$......	$......
....	Nursery	No. 4½	10′	5/8″	......	......	$......	$......
....	Nursling	No. 4½	12′	1/2″	......	......	$......	$......
......	Neighing	No. 5	10′	3/4″	......	......	$......	$......
e	Neptune	No. 5	12′	5/8″	......	......	$......	$......
......	Nerves	No. 5	12′	3/4″	......	......	$......	$......
......	Nervous	No. 5	14′	5/8″	......	......	$......	$......
....	Nestegg	No. 5	16′	1/2″	......	......	$......	$......
......	Nightengale	No. 6	10′	1″	......	......	$......	$......
d....	Nightmare	No. 6	12′	1″	......	......	$......	$......
......	Numbskull	No. 6	14′	3/4″	......	......	$......	$......
......	Nunnery	No. 6	14′	1″	......	......	$......	$......
rt....	Nettle	No. 6	16′	5/8″	......	......	$......	$......
......	Neutral	No. 6	16′	3/4″	......	......	$......	$......
n....	Newsman	No. 6	16′	1″	......	......	$......	$......
.. .. ..	Nicety	No. 6	18′	5/8″	......	......	$......	$......
......	Nickel	No. 6	18′	3/4″	......	......	$......	$......
ing..	Nickname	No. 6	18′	1″	......	......	$......	$......
h ...	Niggardly	No. 6	20′	5/8″	......	......	$......	$......
....	Nightcap	No. 6	20′	3/4″	......	......	$......	$......
....	Nihilist	No. 8	17′	1 1/4″	......	......	......	$......
..	Nimbleness	No. 10	16′	1 1/2″	......	......	$......	$......
......	Nimious	No. 11	24′	1″	......	......		$......
.....	Nitrous	No. 12	22′	2″	......	......	$......	$......
g....	Nitrifies	Vertical	1′	1 1/2″	......	......	$......	$......



No. 3 POWER BENDING ROLLS.

No. 3 POWER BENDING ROLLS.

These rolls are made from 6 to 10 feet long between housings, and are designed for boiler plate and tank iron up to 3/8-inch thick.

Feeding rolls are placed one over the other and geared together.

The bending roll is placed at the back and moves in inclined ways in the housings.

Each end can be raised or lowered, singly or both together, by power.

One bearing of the upper roll is pivoted so that it can be swung out of the way.

Initial rolls are made of wrought iron.

The back roll is cast iron.

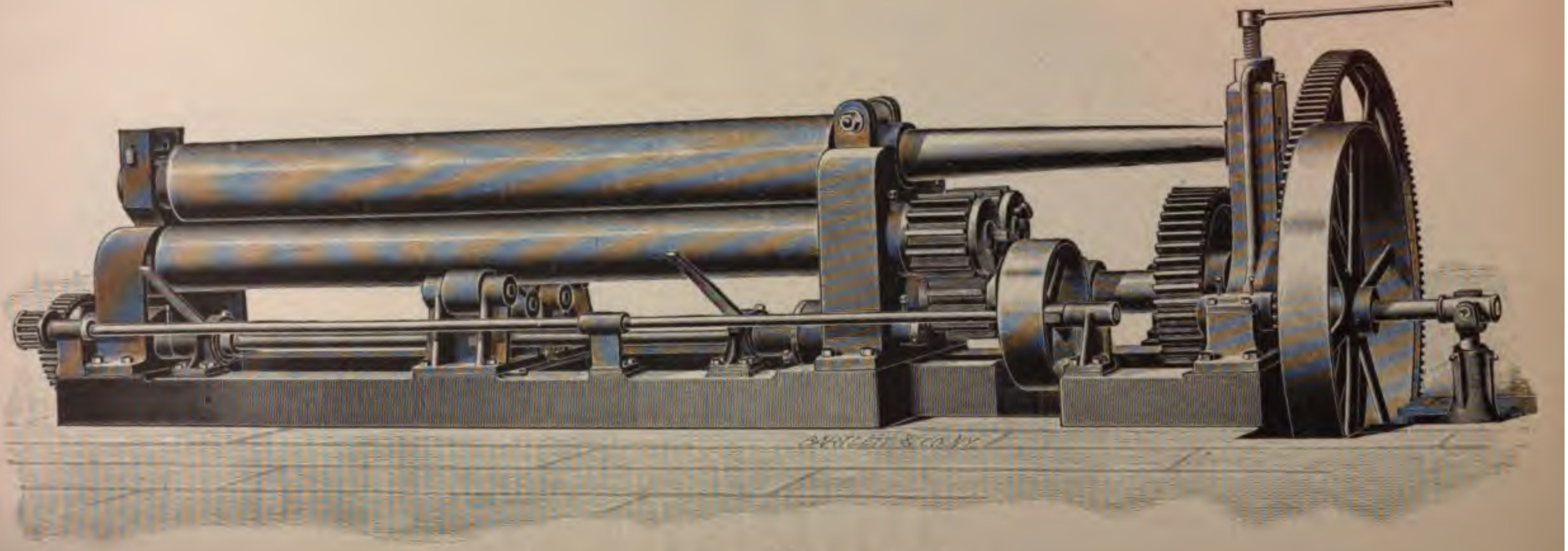
The housings are independent and must be secured to foundation. Sole plates are furnished on special order only.

Countershaft pulleys 24 inches diameter, 7 inches face.

Speed, from 150 to 170 revolutions, according to size of roll.

Elevating countershaft pulleys 12 inches diameter, 2½ inches face.

Speed, 300 revolutions.



No. 5 POWER BENDING ROLLS.

No. 5 POWER BENDING ROLLS.

This machine is for bending plates from ½ inch to ¾ inch in thickness and usually from 10 to 16 feet in width.

The rolls are solid wrought iron forgings arranged in pyramid form. The lower rolls are geared together, while the upper or bending roll is operated by the friction of the plate in passing through. The bending roll is adjustable by power to suit the thickness of plate and the radius to which it is to be bent. It has a removable bearing at one end and projects beyond the housing at the other in the form of a taper arm. Provision is made for depressing the extreme end of this arm by means of the screw shown in illustration, thus raising the opposite end and permitting the removal of a ring or flue. This feature will be found of particular convenience and advantage in boiler and other shops where plates are to be bent to complete circles.

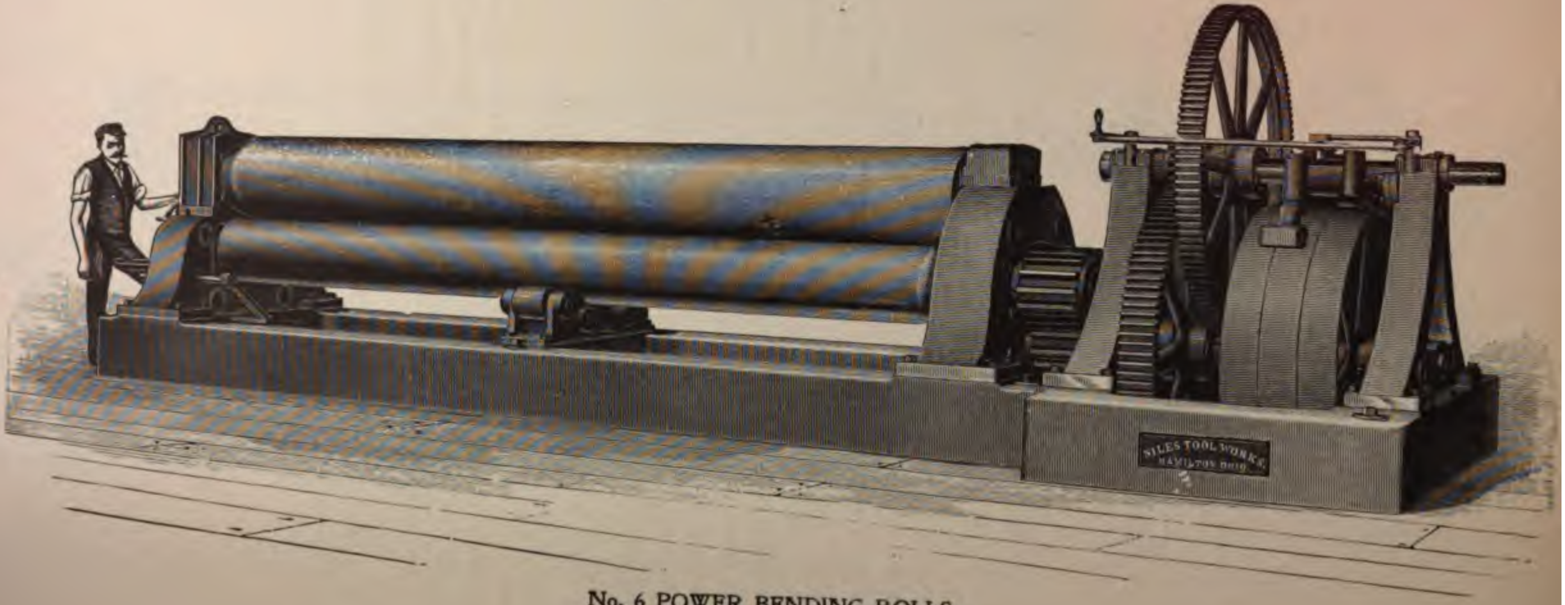
Midway between the housings, a gang of supporting rollers is placed to give additional stiffness to the lower rolls. The machine is firmly tied together by a heavy cast-iron sole-plate. It is very strongly geared and all parts are made exceptionally stiff and substantial.

Suitable levers and clutches are conveniently placed for the quick and easy control of all the operations of the machine.

Countershaft pulleys are 36 inches in diameter for 6-inch belt and should run 190 revolutions per minute.

The illustration represents this machine as arranged for belt driving power, although the design permits the substitution of a pair of reversing engines for driving the machine, and it is so made when desired. When engines are used, the sole-plate is extended, forming a base to receive them, and the whole then becomes one solid, rigid machine.

This type of tilting roll, with tapered extension, may also be applied to Nos. 3, 4 and 6 Bending Rolls, if so desired.



No. 6 POWER BENDING ROLLS.

No. 6 POWER BENDING ROLLS.

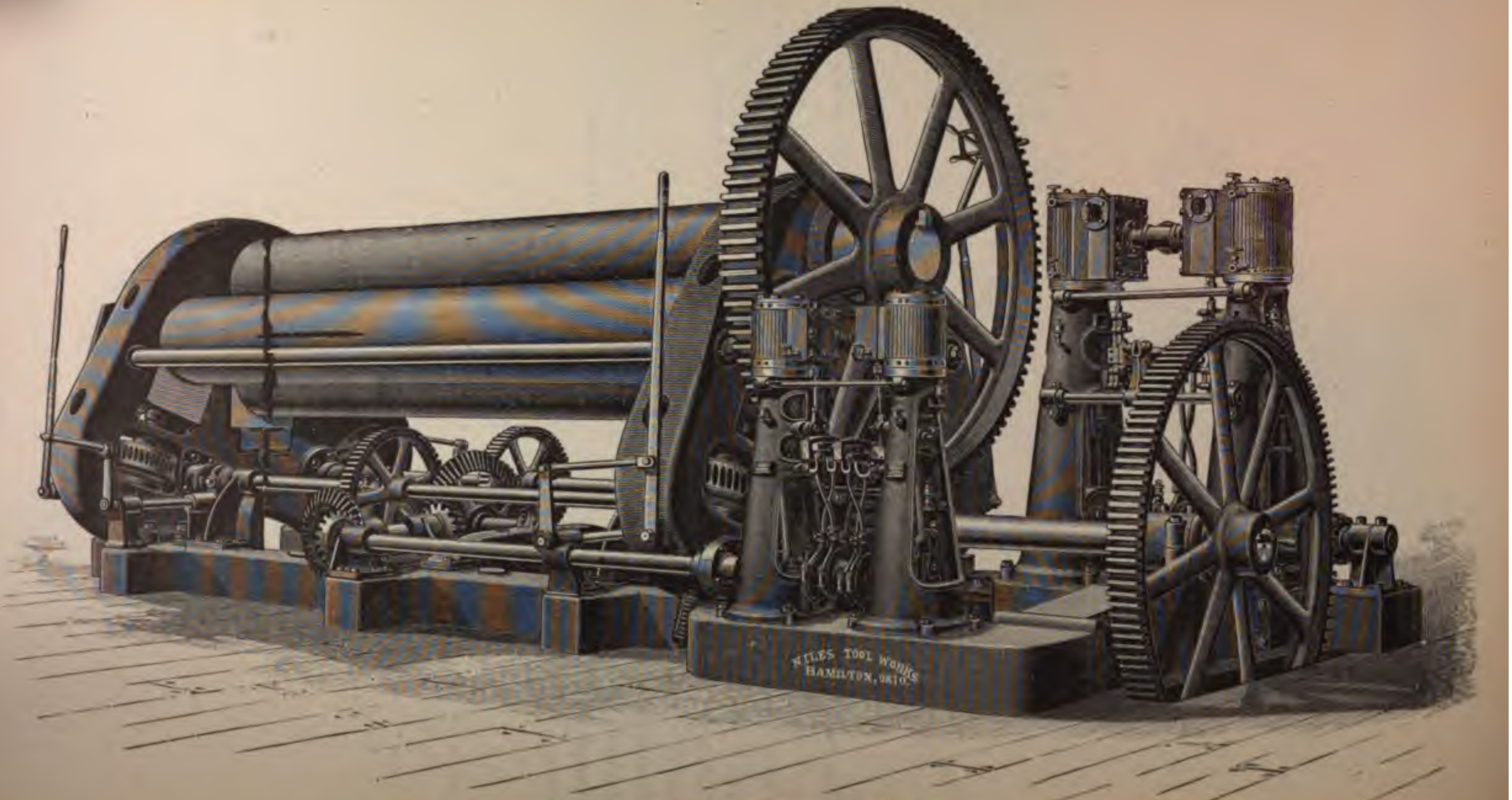
This machine is for bending plates from ⅝-inch to 1 inch thick and from 10 to 20 feet in width. It is a very powerful tool, of immense weight and strength.

The rolls are solid wrought iron forgings arranged in pyramid form. The longer sizes have supporting rollers midway between the housings as shown in illustration. If thick, narrow sheets are to be bent, this support may be carried over the top roll, and the upper part can be removed when desired.

One bearing of upper roll is removable for rings or flues.

Countershaft pulleys are 36 inches diameter, 10 face. Speed, 230 revolutions per minute.

When desired, a pair of engines can be provided for driving the machine instead of the pulleys.



No. 10 POWER BENDING ROLLS.
Two of these machines were furnished to the United States Government for bending Armor Plate at the Norfolk, Va., Navy Yard.

No. 10 POWER BENDING ROLLS.

FOR SHIP PLATE.

Will bend plate iron up to 1½ inches thick, and 16 to 22 feet long.

This machine has four rolls—two central rolls, one placed above the other, and two side rolls moving in inclines on either side, adjustable to suit the diameter to be bent.

The rolls are all solid wrought iron forgings.

The center rolls are driven by a pair of reversing engines, running them in either direction.

The side rolls are raised and lowered by a pair of independent reversing engines. These rolls may be operated together or separately, or either end of either roll may be raised independently, as may be required.

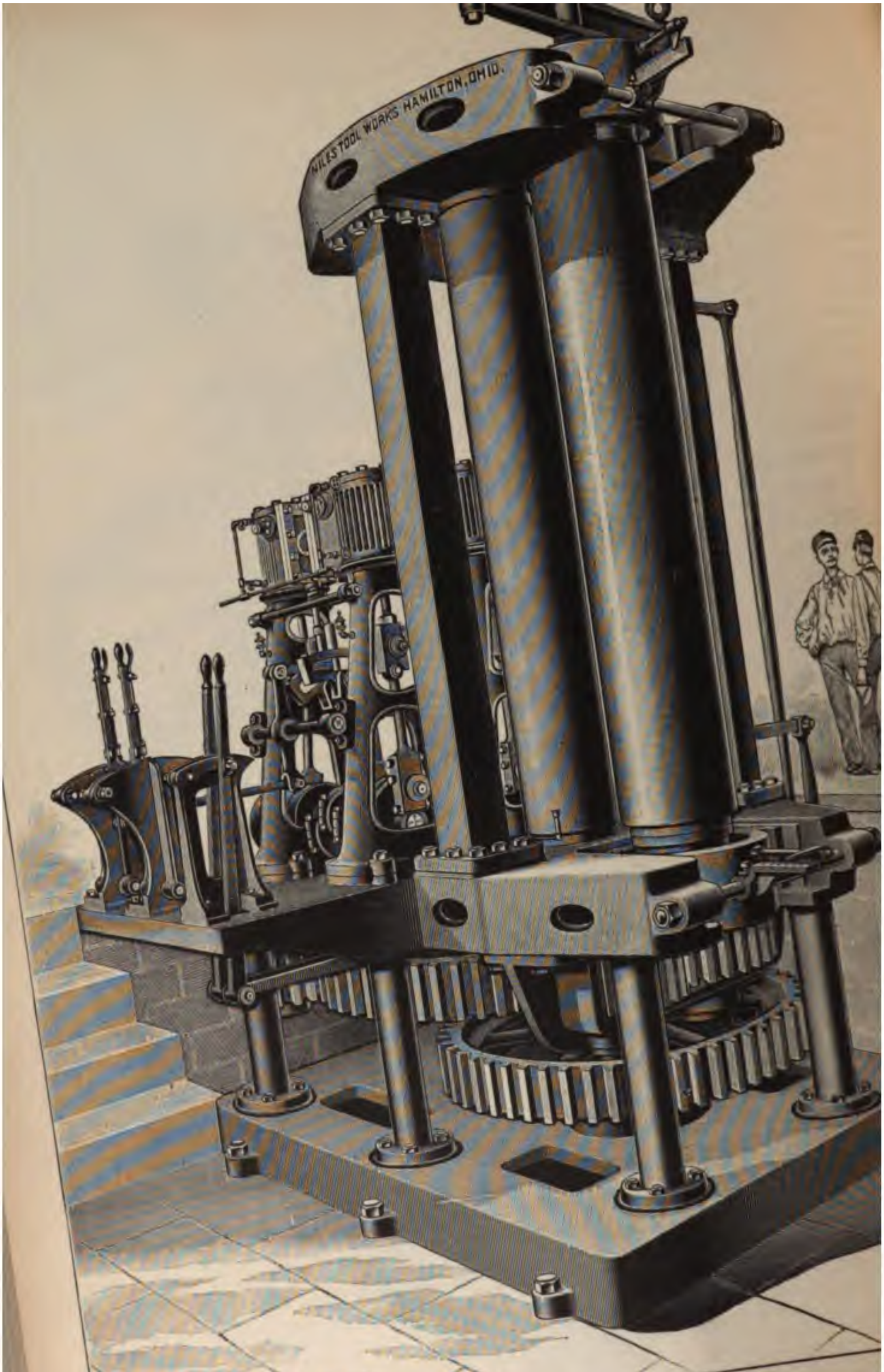
The housings supporting the rolls are very strong and substantial. The journal bearings of the rolls are of very large diameter and fitted into boxes set into the housings.

The entire machine is mounted on a very heavy sole-plate provided with anchor-bolt holes to secure it to the foundation.

The machine will bend ship plates, curving them in any manner required, and has ample power and strength to do the work expeditiously.

A machine constructed in this manner, with four rolls, curves the sheet almost up to the edge, leaving only a short straight end. This is specially important when working heavy plates such as the machine will bend.

The machine is intended to be set in a pit, upon a solid foundation. All reversing and operating levers, etc., are brought above the floor line, which should be about the height of the tie-rod.


NILES TOOL WORKS HAMILTON, OHIO.

VERTICAL POWER BENDING ROLLS.

Two of these machines were furnished to the United States Governmen

Armor Plate at the Boston, Mass. and Mare Island, Cal., Navy Yards.

VERTICAL POWER BENDING ROLLS.

This machine has been designed for bending heavy ship plates. It will bend iron or steel plates 1½ inches thick and 10 feet wide. It has three rolls, arranged in the form of a triangle. Bending roll and feed rolls are all of wrought iron forgings, with large journals running in brass bushings.

Bending roll is adjustable by power. It is provided with suitable indicators to facilitate setting. Roll is counterbalanced and upper bearing of roll is so arranged as to permit the roll being hoisted full height when the plate is to be taken out.

Housings are cast in strong box form, united by heavy posts of rectangular section,arranged to leave front of machine entirely unobstructed. Lower housing is carried back in the form of a sole-plate to receive the vertical driving and adjusting engines.

The feed rolls are driven by steel pinions, gearing into a steel driving pinion common to both, and receiving motion through a train of gears from a pair of vertical link-motion reversing engines.

Bending roll is adjusted by heavy steel screws, placed in the upper and lower housings respectively, and receiving motion from a pair of vertical link-motion reversing engines. By means of suitable clutches and levers, the ends of bending roll may be adjusted separately or together.

All levers for operating engines and machine are arranged in convenient position on one side of the machine where they can be reached by the operator from one position.

The whole machine is mounted on a heavy sole-plate, making it one massive, rigid tool. The floor line is about on a level with top surface of lower housing, the gearing and sole-plate being in a pit.

This is a very strong and powerful machine capable of severe and continuous service, such as required in ship yards.

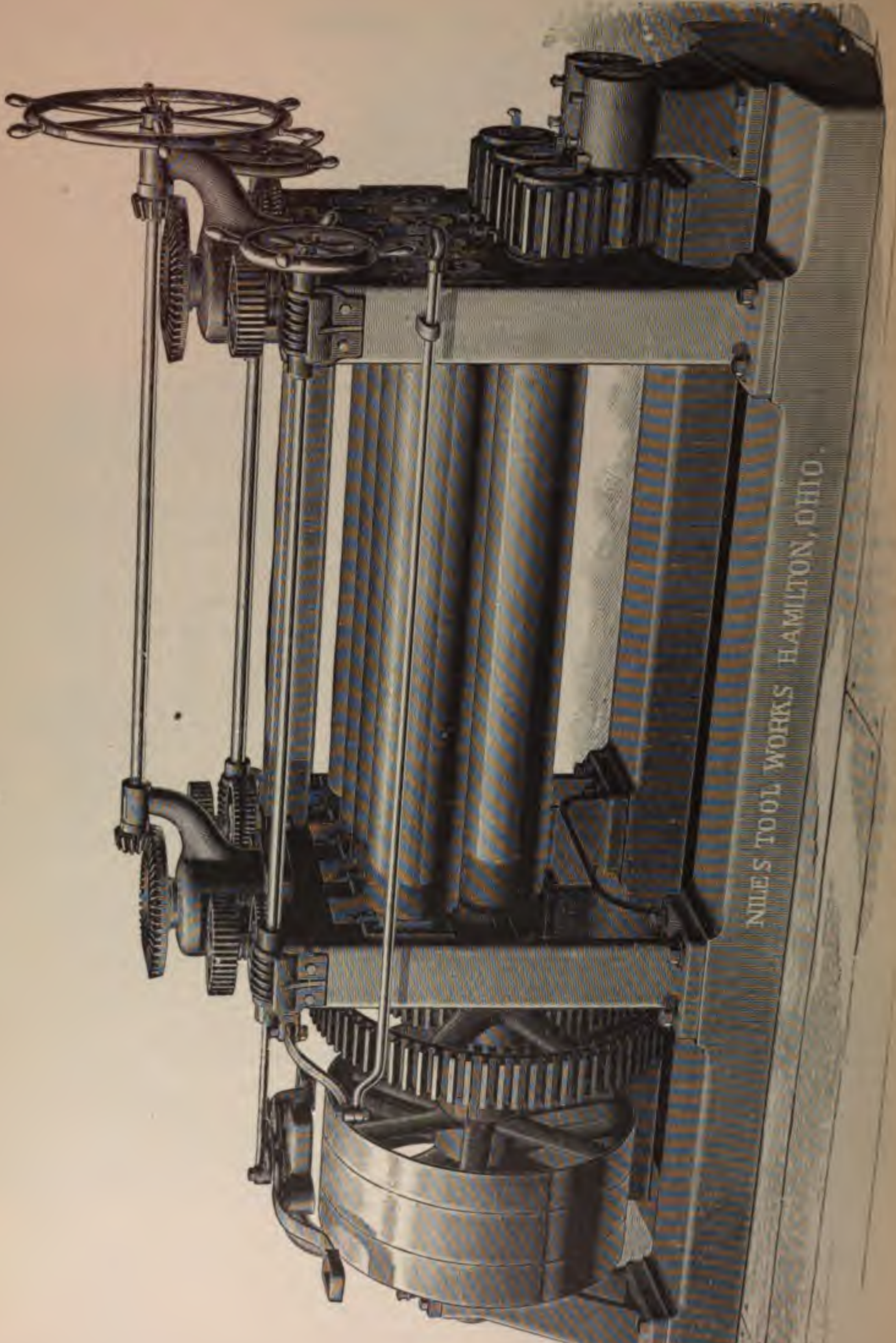

NILES TOOL WORKS HAMILTON, OHIO.

PLATE STRAIGHTENING MACHINE.

PLATE STRAIGHTENING MACHINES.

machine is designed for straightening plate iron for boilers, tanks, safes, and all other
Such work can be done on this machine perfectly, and at a great saving of labor and

nachine has seven rolls arranged in two tiers—four rolls in the upper tier and three
er.

ower rolls are driven by steel pinions.

ipper series of four rolls are adjustable vertically to suit the thickness of sheet to be
ed. Indexes are provided for setting these rolls. The outer rolls of this series are
independently, the inner rolls are raised or lowered together, and the entire four rolls
rranged so that, after being once set, they may all be adjusted at the same time with-
ing their relative positions.

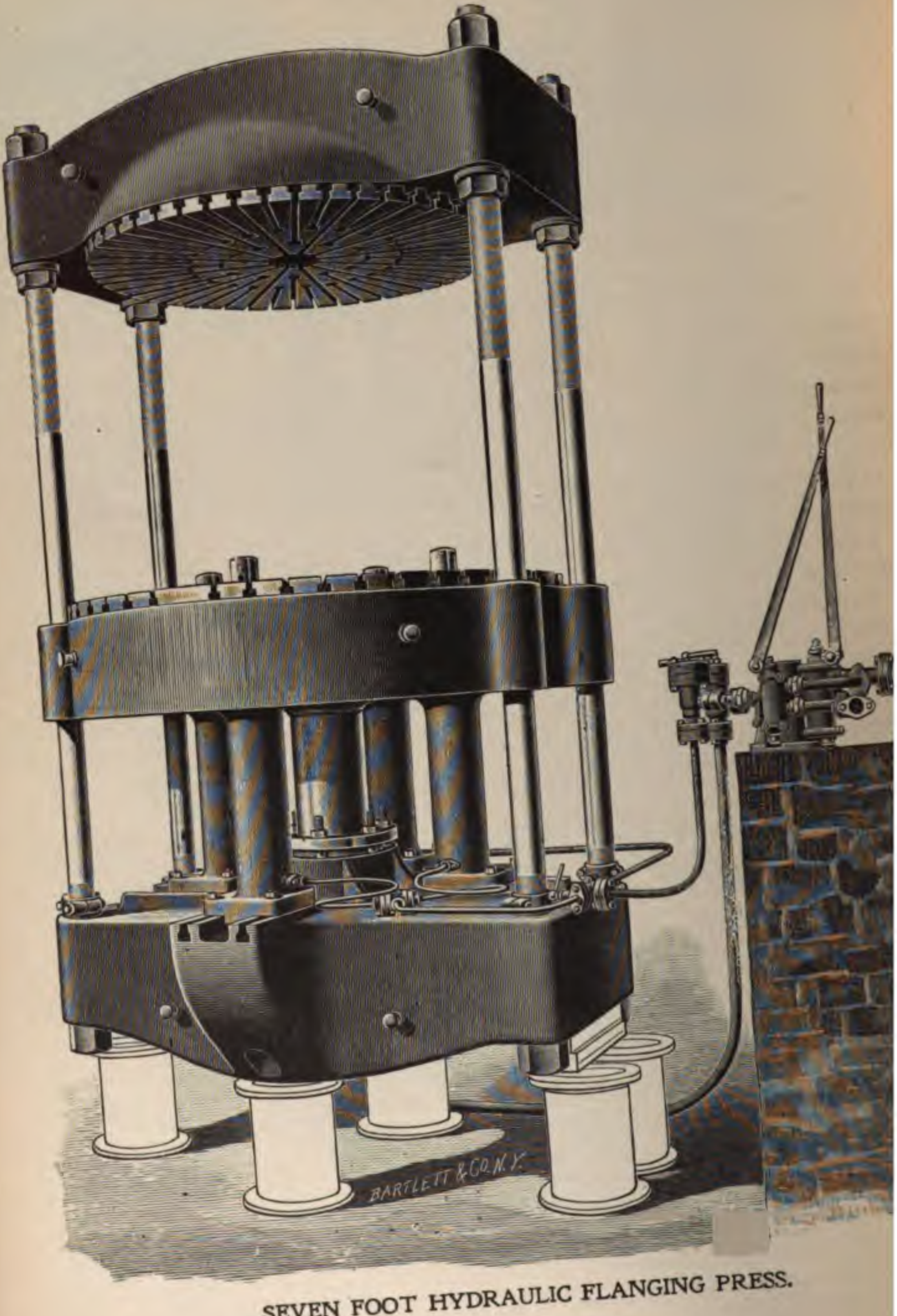
e rolls are steel forgings, of sufficient size to prevent spring. They run in journal
f large size, carefully fitted to the housings.

machine is carried on a base plate, tying it together and therefore requiring but slight
1.

ng pulleys are arranged for straight and cross belts, to run the rolls in either direction.
uild a number of sizes for straightening plate from No. 16 to 1 inch thick, as given in
ing list:

LIST OF SIZES.

: L.	Type of Machine.	Length of Plate.	Thickness of Plate.	Weight.	Price.
....	S R 0	48"	3/16"	....	$........
....	S R 1	48"	3/8"	....	$........
al.....	S R 1	60"	1/4"	....	$........
:.......	S R 2	48"	1/2"	....	$........
....	S R 2	60"	1/2"	....	$........
....	S R 3	48"	5/8"	....	$........
:.......	S R 3	48"	1"	....	$........
... .	S R 3	60"	5/8"	....	$........
....	S R 3	90"	1/2"	....	$........
:	S R 4	60"	1"	....	$........
....	S R 4	84"	3/4"	....	$........
....	S R 5	120"	3/4"	....	$........


BARTLETT & CO. N.Y.

SEVEN FOOT HYDRAULIC FLANGING PRESS.

HYDRAULIC FLANGING PRESS.

Presses of this pattern are largely used in England and this country for flanging round boiler heads. They are also applied to rectangular and irregular shapes, such as fronts and throat sheets of fire box boilers. They are also useful for dishing heads, such as are used in oil tank cars, condensers, etc., and for a large variety of miscellaneous bending, pressing and forging.

The machine shown in cut consists of a large central ram, and four of smaller size ranged around it.

In boiler head flanging, the central ram is brought up to clamp the plate. The four outer rams carry the former, which bends or flanges the plate in the manner desired.

The smallest machine of this kind in use is for air brake cylinders and the like.

The general dimensions of the largest Press so far constructed, are as follows:

Distance between columns, 12 feet. Columns, Steel Forgings, 7½ inches in diameter. Total weight of the machine, about 100 tons. Height, 25 feet 2 inches. Face of the upper table, 10 feet. Face of the movable table 12 feet.

Total pressure on the plates, 400 tons.

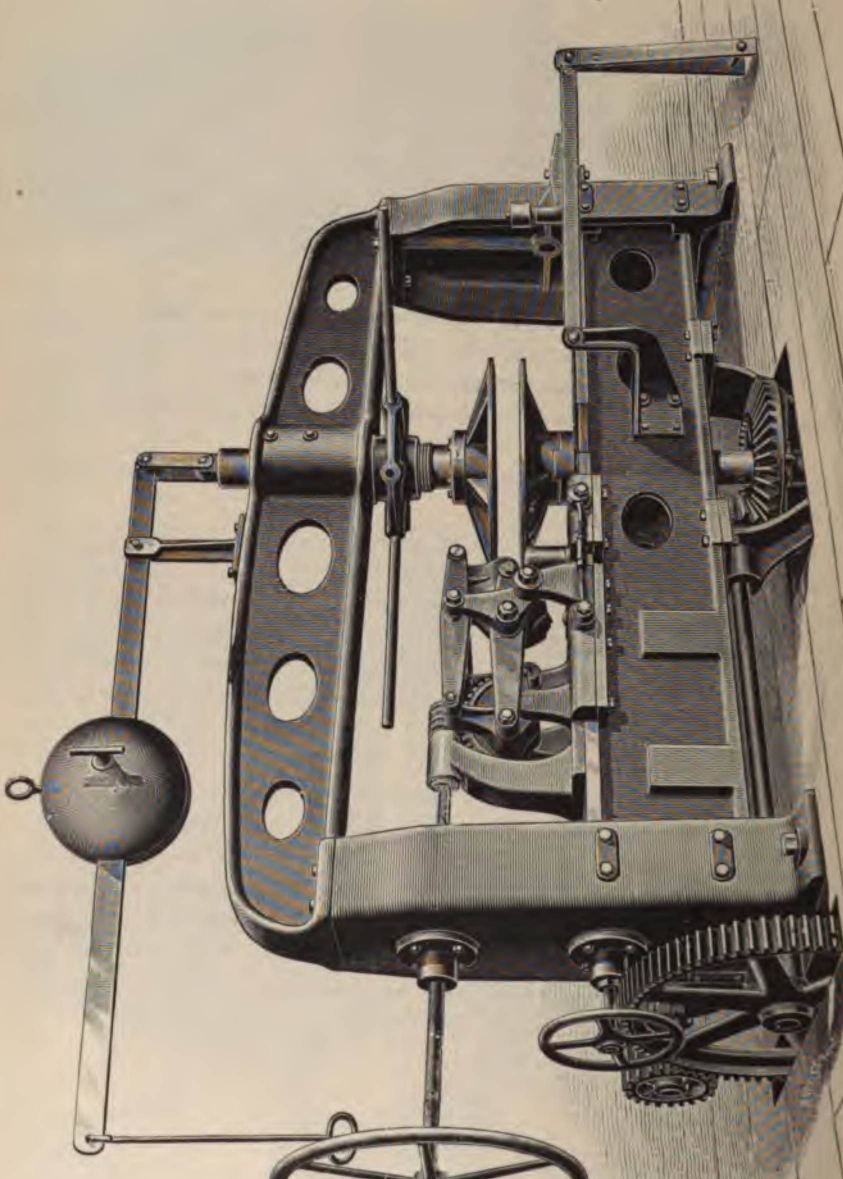
This machine is fitted with seven Hydraulic cylinders, four Vise Rams each 7 inches in diameter, 30 inch stroke, and three main rams 14 inches in diameter, 36 inch stroke.

When light work only is being done, the middle ram can be used, which exerts a pressure f 150 tons. When convenient, the two outer rams can be used, exerting a pressure of 300 tons.

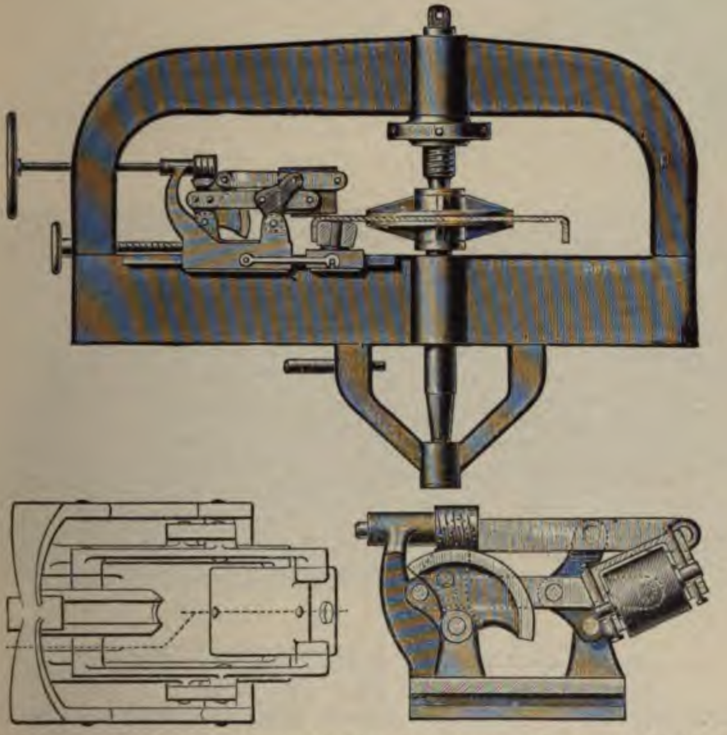
The Valves controlling the various cylinders are so arranged that the changes from operatg one, two or three cylinders can be accomplished by the simple movement of one lever.

Machines of this class are adapted for a very wide range of work.

Code Word for type, Fromba.



BOILER HEAD FLANGING MACHINE



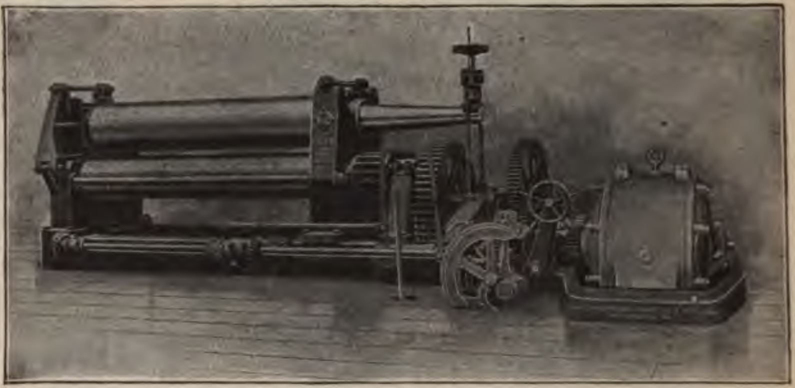
CLARK'S IMPROVED BOILER-HEAD FLANGING MACHINE.

METHODS OF OPERATION.

The plate to be flanged is clamped between two discs, and rotated with its edge projecting over a short vertical roller. A swivelling roller turns the flange down as the plate passes quite rapidly under it. This upper, or swivelling roller, is carried in a housing supported by two parallel levers, which are actuated by worm gearing and hand wheel, as shown. The motion obtained by the combined action of the parallel levers is a perfect one for the purpose. The upper roll swivels from a horizontal to a vertical position, directly round the center of the fillet in the head being flanged, giving a smooth, easy motion for the flow of the metal into its new form. The saddles carrying the two rollers are adjustable along the bed, thus making heads of varying diameters without formers. This mechanism enables heads to be flanged with but little expenditure of power. No hole is necessary in the plate. Perfect heads of exactly uniform diameters are made as rapidly as the furnace can heat them. This machine is doing service in various parts of the country.

It will flange plates from 20 inches to 72 inches in diameter.

Code Word, Fronche.



A SET OF No. 8 BENDING ROLLS,

WITH INDEPENDENT ELECTRIC DRIVE AND REVERSING CONTROLLER.

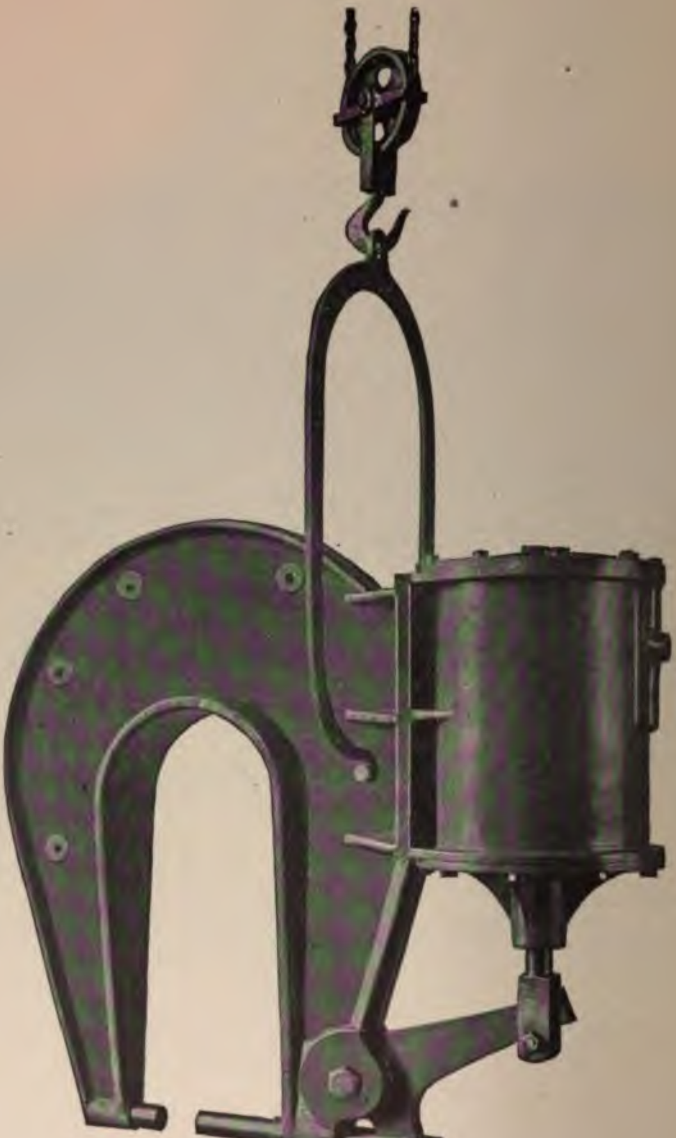
All tools may be arranged for electric motor drive.

The following code words can be used when inquiring for electrically driven machine tools.

Code Word.	For
Dismount	Machine to be furnished with electric motor.
Dispel	Machine to be adapted for electric drive but without motor.

PART XXI.

RIVETING MACHINES.



BRIDGE OR GIRDER RIVETER.

RIVETERS OPERATED BY COMPRESSED AIR.

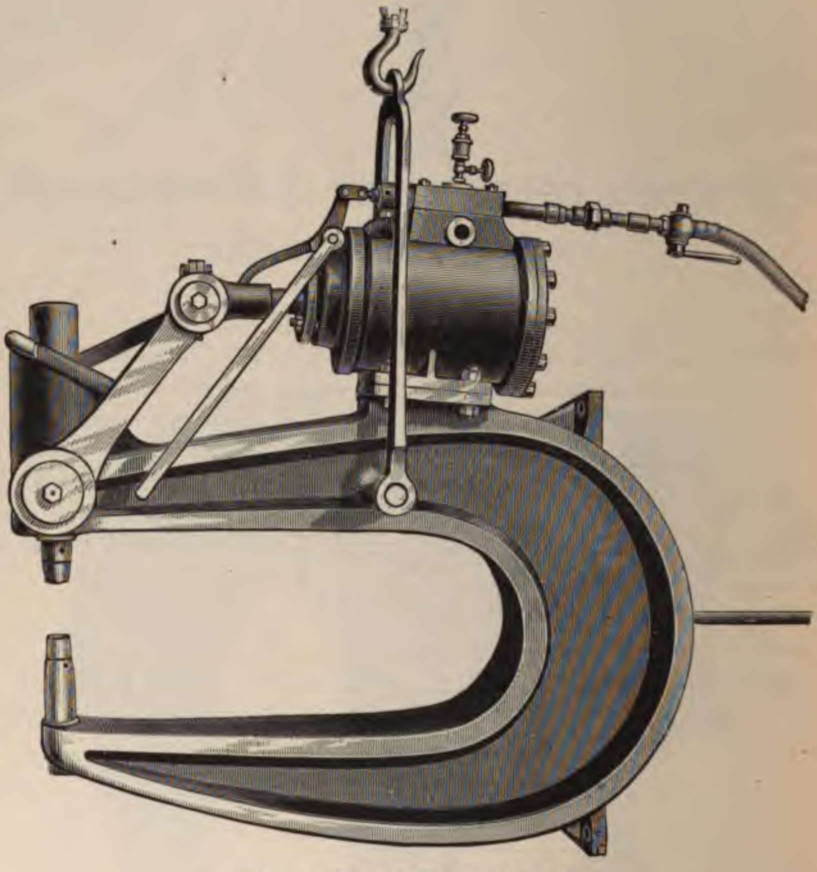
BRIDGE OR GIRDER RIVETER.

The riveting machine shown on opposite page is one of the best machines on the market for all classes of work within its reach, having been especially designed for bridge work. It has a gap or 15 inches and a reach of 35 inches. There is no trouble in adjusting the dies to suit the many different thicknesses of plate to be riveted, but the required 50 tons pressure on the rivet dies is had at any point of the stroke, which is 3 inches. There is furnished with each machine a shoe, to be used for holding same in an upright or horizontal position for stationary purposes, and when used as a portable machine it is hung from the gravity point by the bail, and brought in any position to suit the work.

The weight of this machine, complete, is 1,000 lbs.

Code Word. Furrelique.

Price, $ ....



BRIDGE OR GIRDER RIVETER.

BRIDGE OR GIRDER RIVETERS.

The machine illustrated on the opposite page may be operated by steam at a pressure of from 60 to 70 pounds, but we advise the use of pneumatic pressure. The piston rod connects levers of different lengths, forming a toggle joint. The lower ends of the larger levers are attached to fixed centers on the frame, and the end of the central short lever is attached to the dolly-bar, into the lower end of which the head-die is screwed. By this latter arrangement, any desired change in the distance between the dies is easily effected. The dolly-bar has a stroke of 3½ inches, and is acting in a direct line with the axis of the rivet.

The machines are of sufficient strength to operate on 1-inch rivets.

The machines are balanced so that when suspended, the same can operate either in a vertical or horizontal position, as may be found most convenient.

Machines above 25-inch reach are provided with lugs, as shown on opposite page, capable of fixing the same as a stationary machine whenever desired.

POWER OF THE ABOVE JAW RIVETERS.

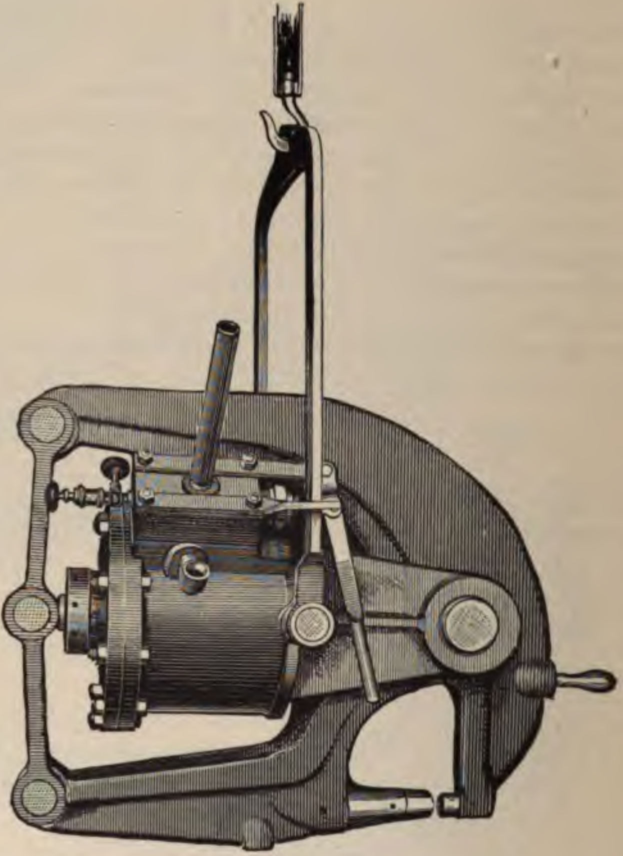
Operated by a 10-inch Cylinder.

By actual experiments we have found that the pressure upon the rivets in gross tons is as follows:

At 50 pounds pressure in Air Receiver, - - - - - - - - -	25.9 tons.
60 " " " " - - - - - - - - -	30.2 "
70 " " " " - - - - - - - -	34.5 "
75 " " " " - - - - - - - - -	36.6 "
80 " " " " - - - - - - - - -	38.8 "
85 " " " " - - - - - - - - -	42.0 "

SPECIFICATIONS.

Code Word.	Reach at Center.	Distance between Arms.	Working Cylinder.	Weight.	Price.
Fuscabis............	25"	14½"	10"	1180 lbs.	$ 850 00
Fuscandi............	34½"	15"	10"	1780 lbs.	1,100.00
Fuscandos	55"	15"	10"	3300 lbs.	1,400.00
Fuscantem	36"	20"	12"	3200 lbs.	1,300.00



LEVER RIVETER.

FOR CHANNEL-IRON BRIDGE WORK.

LEVER RIVETERS.

FOR CHANNEL-IRON, GIRDER AND GENERAL BRIDGE WORK.

The Pneumatic Riveter illustrated on the opposite page possesses many unique features. In consequence of the peculiar construction and arrangement of the elbow, or toggle joint, between the power employed for operating the machine and the hinged or pivoted arms which carry the dies, a small 10-inch cylinder will produce at the end of the stroke, or when the dies are nearly closed, a pressure upon the rivet of about 50 tons.

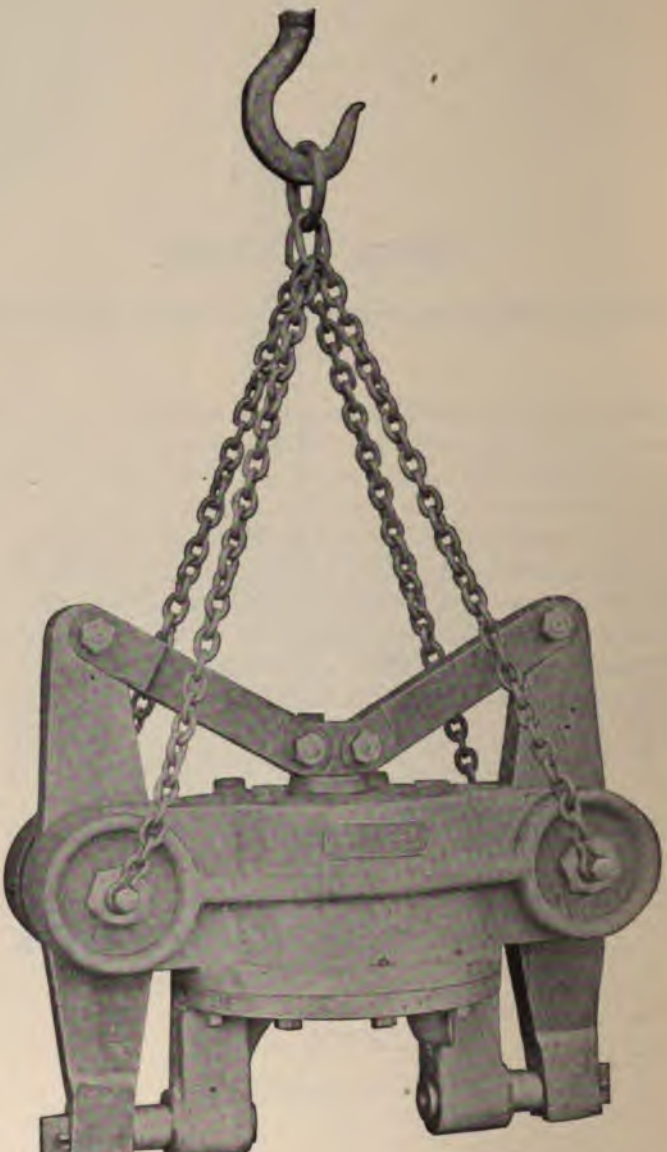
With this riveter 3,500 ¾-inch rivets can easily be driven in a day of ten hours.

The Riveter illustrated is designed for riveting plates to 5-inch channel iron but when required a somewhat different style of iron can be supplied, enabling the machine to straddle the edges of girders or beams, having 6-inch angle irons on each side.

In the following table we have used A to designate the former type (illustrated), and B the latter type.

SPECIFICATIONS.

Code Word.	Style	Dia. of Cylinder.	Weight.	Price.
Furvos........................	A	10''	825	$......................
Furvum........................	A	11½''	900	$......................
Fusain	B	10''	835	$......................
Fusaiole........................	B	11½''	925	$......................



MUD-RING RIVETER.

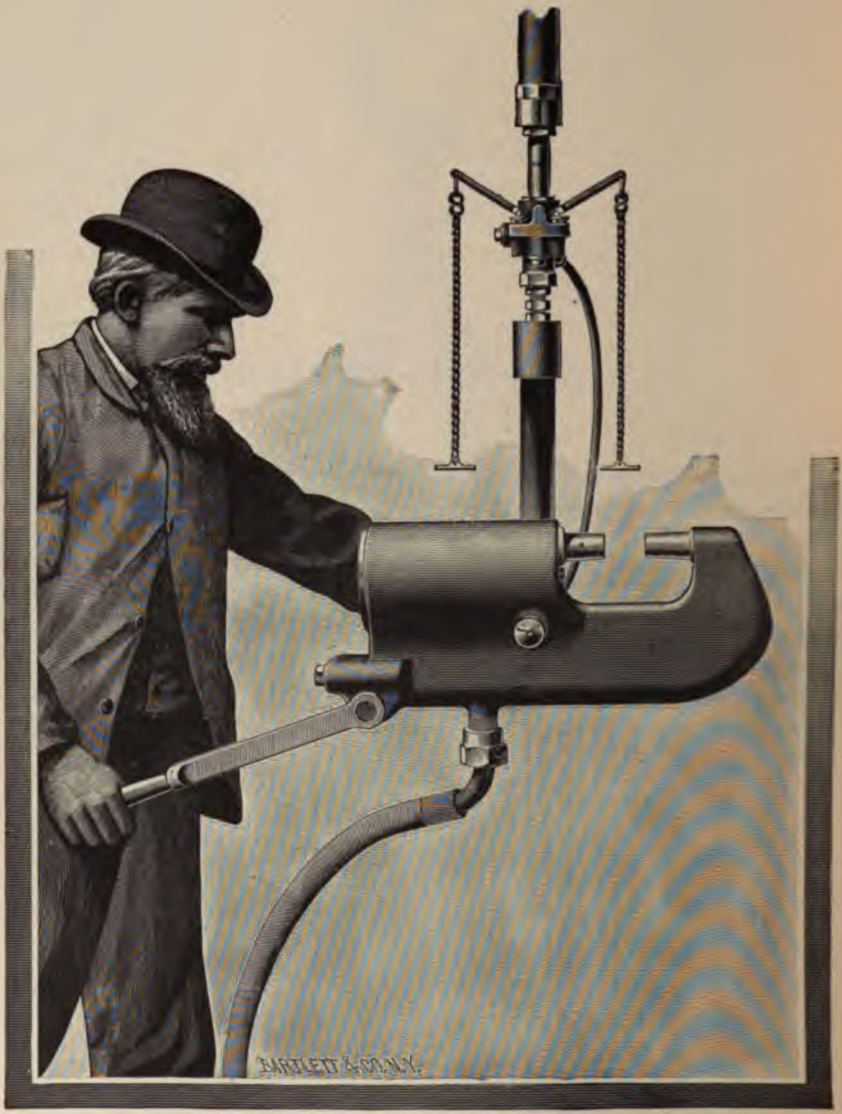
MUD-RING RIVETER.

This machine consists of a cast-iron frame with 15-inch cylinder. The end of the piston rod is attached to a steel toggle-joint, which makes connection with two heavy steel levers, or arms, the ends of which secure the rivet dies. It has all the reach and gap necessary to work on single or double riveted mud-rings, and, with a working pressure of 90 lbs. when the toggle is within ½-inch of a straight line, there is a pressure of 75 tons exerted on the dies or rivets. The machine is very simple in construction, and its capacity is as many rivets as can be handed to it; or, in other words, the capacity depends on the rivet heater.

The weight of this machine, complete, is 800 lbs.

Code Word, Fusciano.

Price, $.....................

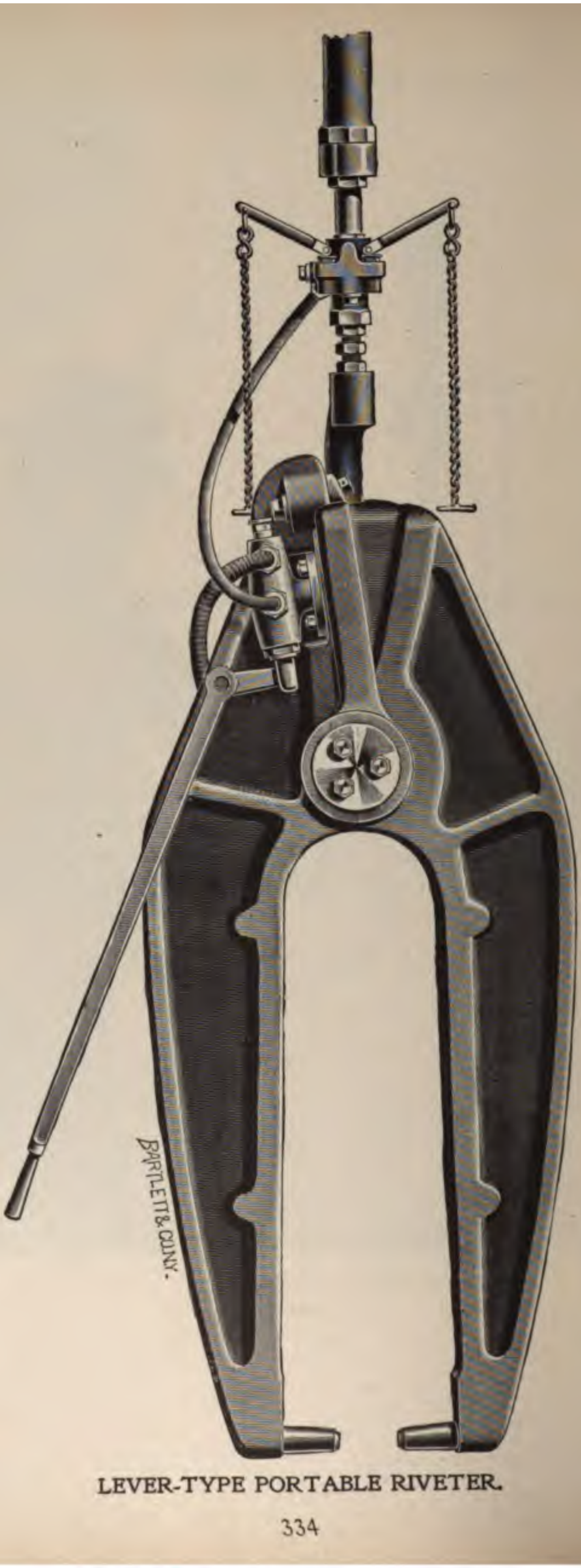

BARTLETT & CO. N.Y.

FIRE-DOOR RIVETER.

HYDRAULIC FIRE-DOOR RIVETER.

This is a direct-acting machine of the most compact form. As its name implies, it is designed for closing rivets round the doors of fire-box boilers. It is also found valuable for work on mud or foundation rings, flanged joints, Adamson flues, etc., and is regularly employed for riveting inverted heads in boilers. The Pennsylvania Railroad Co., in their shops at Altoona, Pa., have an outfit of these portable machines by the aid of which they drive every rivet in their locomotive boiler; a feat which has heretofore been thought impossible. This machine is also convenient for use in bridge and structural work, for lattice girders, etc.

Code word for type, Fusarion.


BARTLETT & CO. N.Y.

LEVER-TYPE PORTABLE RIVETER.

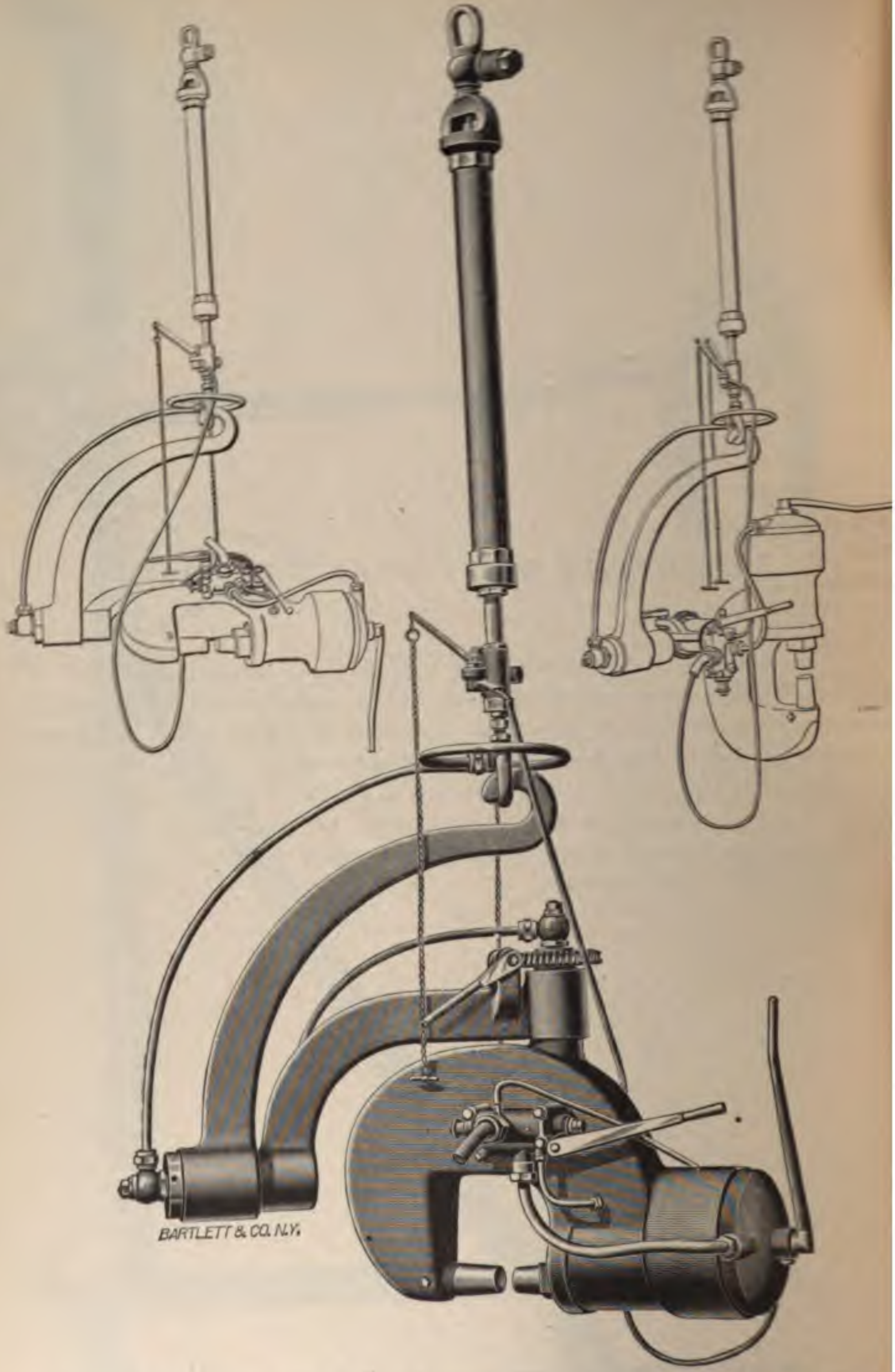
LEVER-TYPE PORTABLE RIVETER.

This design of portable riveting machine has a wide range of uses, as any mechanic can appreciate who will examine its construction. The riveting dies are carried at the ends of arms or levers of any suitable length, a joint or fulcrum being located between them and the applied power. The hydraulic cylinder is at the opposite or short end of the levers, thus the machine acts in a manner not unlike a pair of scissors. This arrangement gives two comparatively slender arms which can reach into all sorts of out of the way places, requiring but little space for their manipulation.

For general purposes this machine is popular from the fact that there is but little of it near the rivet, thus enabling the operator to see his work distinctly. Water pressure comes to the machine through the center or joint on which the levers work, thus leaving it free to swing to any desired position; it is also supplied when desired with a universal hanger and Pressure-Pipe Hoist.

These machines can be furnished for driving any size of rivets up to the heaviest, and of reaches from 2 feet to 5 feet. In addition to various other uses they are very successfully applied to the riveting up of Steel Water Tanks for Gas Holders, which work is often very heavy and exceedingly expensive to do by hand. A mast is set at center of tank, and by means of a light jib the riveting machine can be swung around the entire circle, closing every rivet in the sides. For this duty the machine is usually made with a reach of 5 feet; the arms are of cast steel with cylinder linings and valves of bronze.

Code Word for type, Fuscabat.



DIRECT-ACTING PORTABLE RIVETER, WITH PRESSURE-PIPE HOIST.

DIRECT-ACTING PORTABLE RIVETER.

This is one of a large class of most valuable and convenient machines, which are soon destined to be found in every well regulated shop, especially those where heavy rivets are to be driven. They are made any desired depth of throat from 12 inches to 6 feet and with power to close any size of rivets up to 1½ inches.

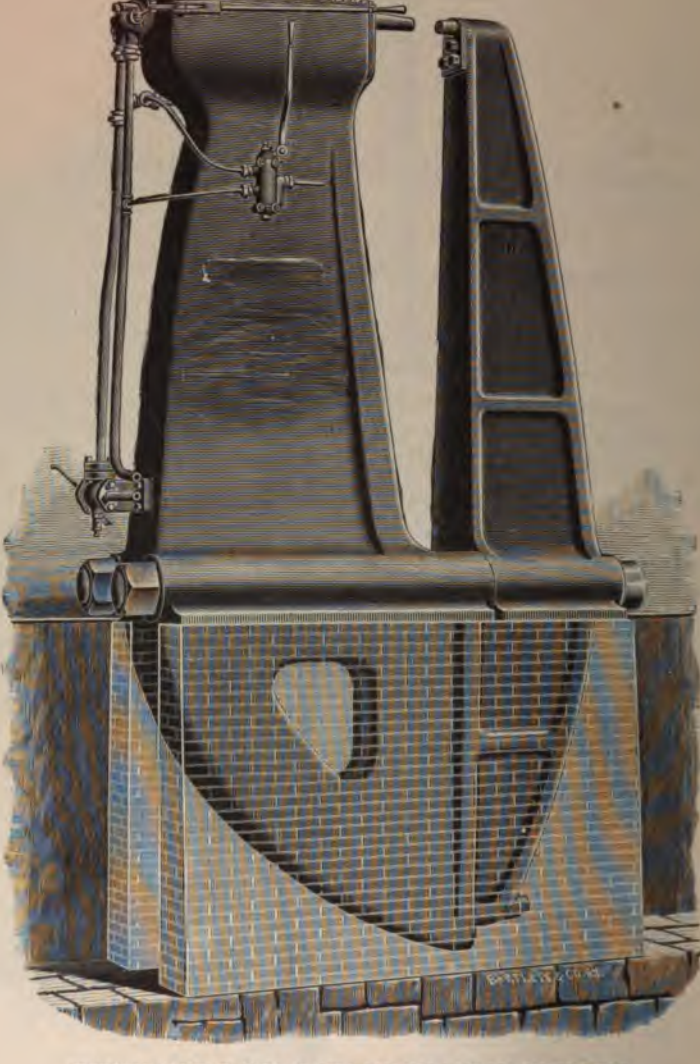
The cut represents a direct-acting machine having a 12-inch throat and capable of exerting a pressure of 150 tons on the rivet. It is suspended from a universal hanger, which enables it to be swung in any conceivable position.

PRESSURE-PIPE HOIST.

Water pressure is supplied to a portable riveter through a telescopic pipe as shown; this device also serves to raise and lower the machine, the smaller pipe acting as a piston in the larger. There are two valves for the purpose of operating this hoist, which are opened and closed by levers and chains, one serving to raise the machine and the other lower it. The frames or bodies of all these portable riveters are made of cast steel; the valves, cylinder linings and the pressure-pipe hoists are of bronze.

These machines are at work in various parts of the country.

Code Word for type, Fuscite.



EIGHT FOOT SIX INCH HYDRAULIC RIVETER.

STATIONARY HYDRAULIC RIVETER.

The cut represents a standard form of stationary riveting machine, which has become so well known as to require no extended description. The housing or main frame of machine is a single casting of iron; the stake or post is made of cast steel which gives the greatest possible stiffness for the least possible section. This feature is important for reaching into shells and flues of small diameter.

The steel stake and main frame have projections or ears through which pass the tie bolts. This gives the stake a broad bearing on the housing proper, affording a lateral support which is not obtained with a forged stake. We are prepared to furnish forged stakes if desired, but in our extended experience have had no reason to recommend them.

These Riveters are all of the flush top pattern, with absolutely nothing projecting above the line of the dies; thus boiler throats, square flanged joints, etc., can be riveted without difficulty. When desired we furnish a Plate Closing Attachment for the purpose of holding the plates firmly together, while the rivet is being closed. This attachment is so arranged that when the rivet is driven all the way up the pressure can be relieved from the plates, and the total effect concentrated on the rivet. This pressure is allowed to dwell on the rivet until it has cooled sufficiently to set; perfect work is thus insured.

The dies should be fed with cold water to keep them from heating. When desired we furnish an automatic pressure regulating valve which is a valuable and convenient attachment.

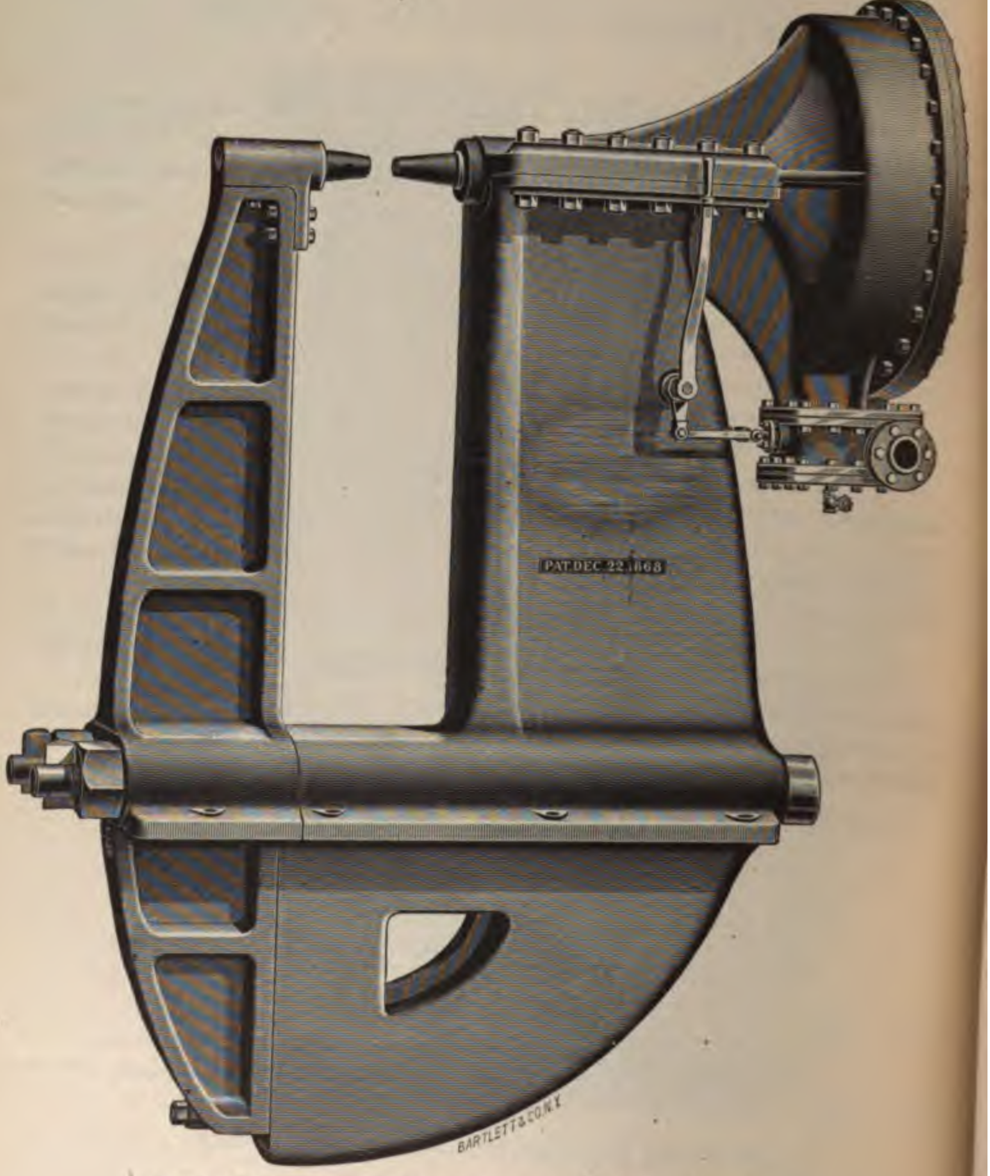
The cylinder linings and valves are of bronze.

The water joints are made with cup leather packings; these cup leathers, being the only method so far discovered for handling this class of machinery.

NINETEEN SIZES. STATIONARY FLUSH TOP HYDRAULIC RIVETERS.

Gap.	40 Tons. 1" Rivets.	50 Tons. 1⅛" Rivets.	75 Tons. 1¼" Rivets.	100 Tons. 1½" Rivets.	150 Tons.
6'	Funeratura ...	Furcelle	Furcraea	Furdles	Special.
8' 6"	Funereal	Furchig	Furcula.	Furentis.... ..	"
10' 6"	Funereos	Furcifere	Furculis..	Furetiere......	"
12'	Funerepis	Furcillis	Furfando... .		
17'	Funeriate......	Furcosi			

Standard sizes all made with or without plate closing attachment and pressure regular. Tee code words refer to riveters without either of there attachments.



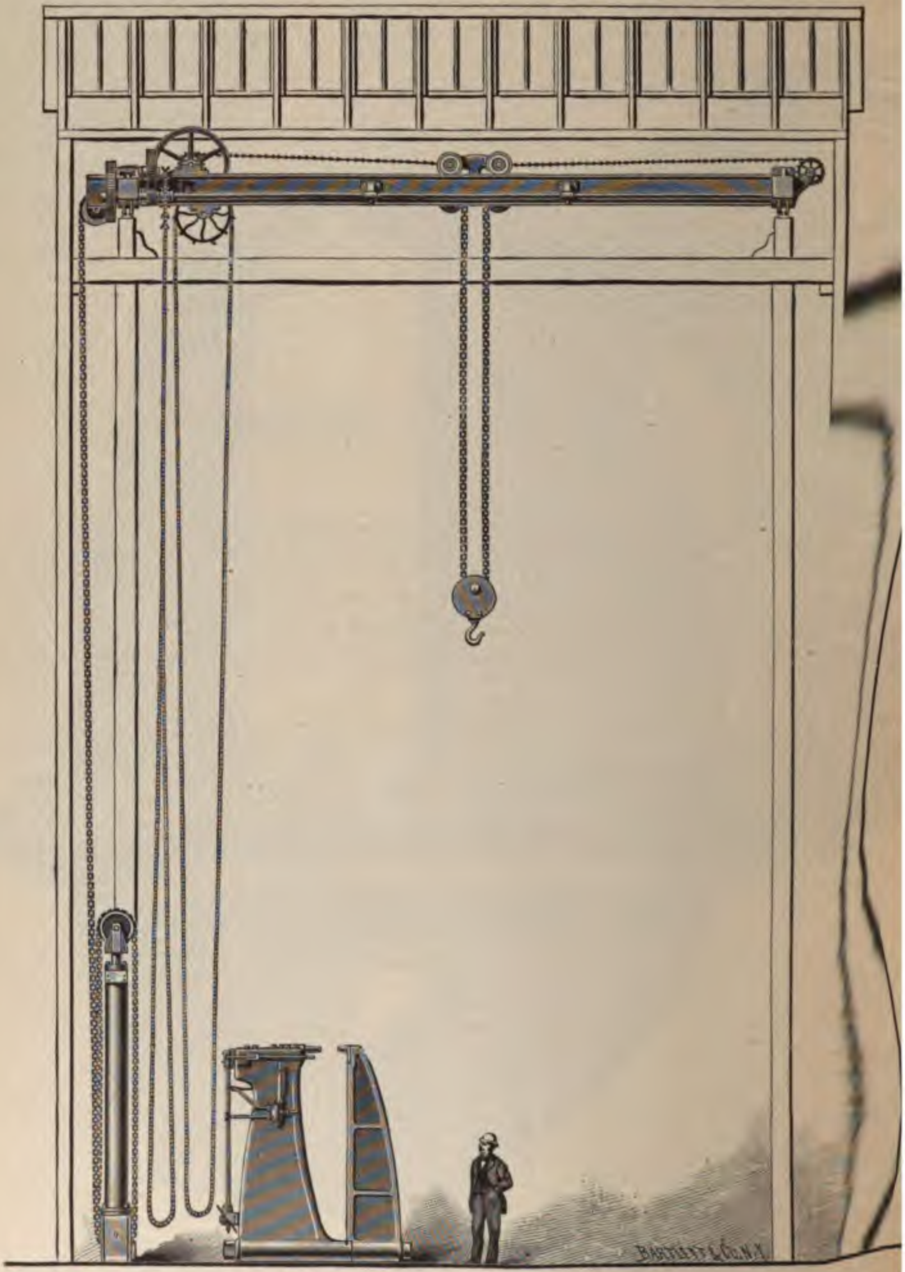
SIX FOOT GAP STEAM RIVETER, 44-INCH CYLINDER.

STEAM RIVETING MACHINE.

The steam riveter as shown has a cylinder 36 inches in diameter and a throat or reach of 6 feet. They are made in a number of sizes ranging from 4 feet to 8 feet 6 inches and with cylinders up to 44 inches in diameter. The design is such that any size of throat and cylinder can be made in combination. Steam is admitted to the cylinder in such a way as to give a quiet pressure on the rivet, in place of the hammer blow which has been one drawback to this type of tool.

The stake is cast steel with a wide earing on the main frame of the machine, where the binding bolts pass through it. This gives great lateral rigidity, which feature is not provided for with forged stakes. The cast steel stake is also stiffer for a given section; it will thus reach into small cylinders and flues.

Code Word for type, Fuscous.


BARTLETT & CO. N.Y.

RIVETING TOWER AND EQUIPMENT.

RIVETING TOWER CRANE.

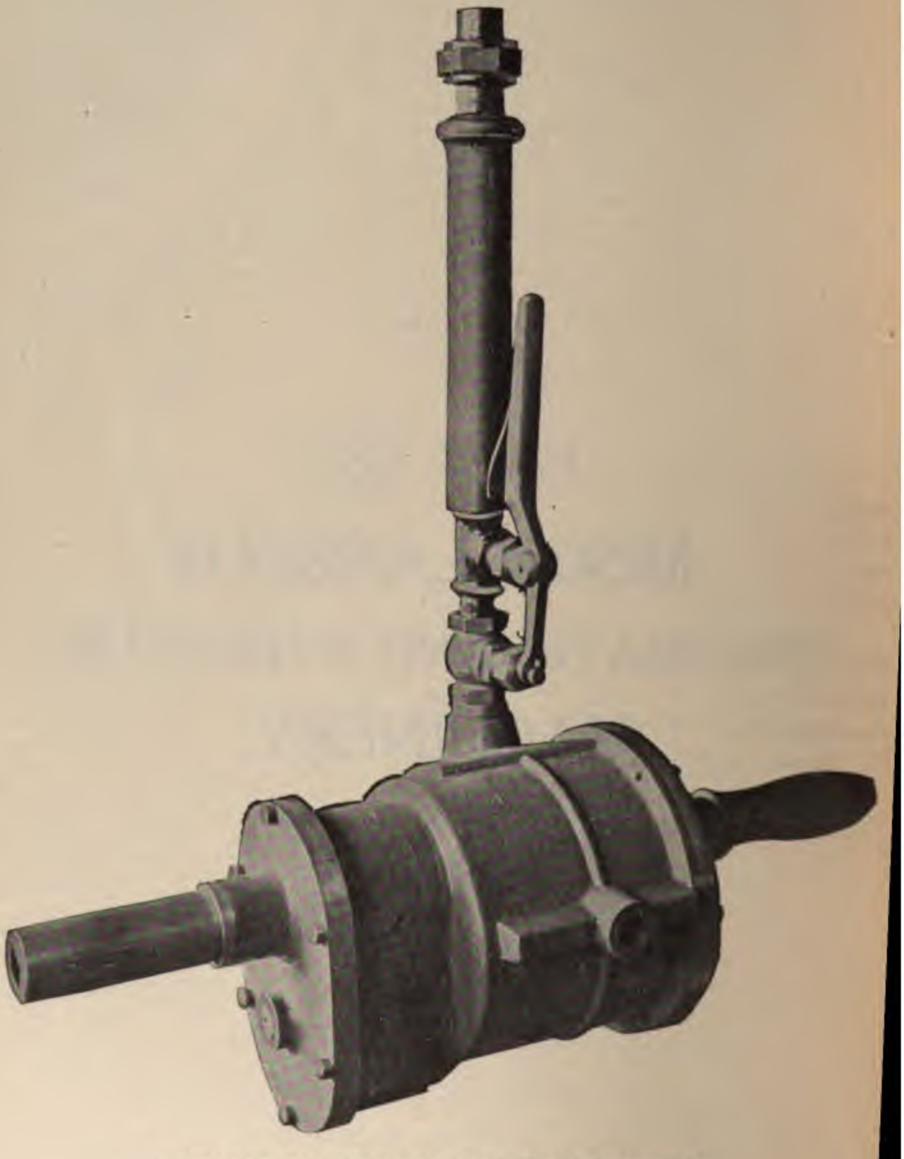
This Hydraulic Travelling Crane is used in conjunction with the hydraulic riveter as shown. The valve for controlling it is attached to the riveter directly under the hand of the operator, who is thus enabled to bring the rivets quickly and accurately between the dies. The handling of the work with facility and accuracy is of the greatest importance.

A riveting machine will drive all the rivets that can be given it, hence the handling of the work to the dies is all important. These cranes are made of any desired span, and of a number of sizes ranging from 6 to 50 tons lifting capacity. The travelling motions are operated either by hand or hydraulic power as desired. These cranes are in operation all over the United States.

Code Word for type, Fuselli.

PART XXII.

MISCELLANEOUS PNEUMATIC AND HYDRAULIC MACHINERY.



ROTARY TAPPING AND DRILLING MACHINE.

ROTARY TAPPING AND DRILLING MACHINE.

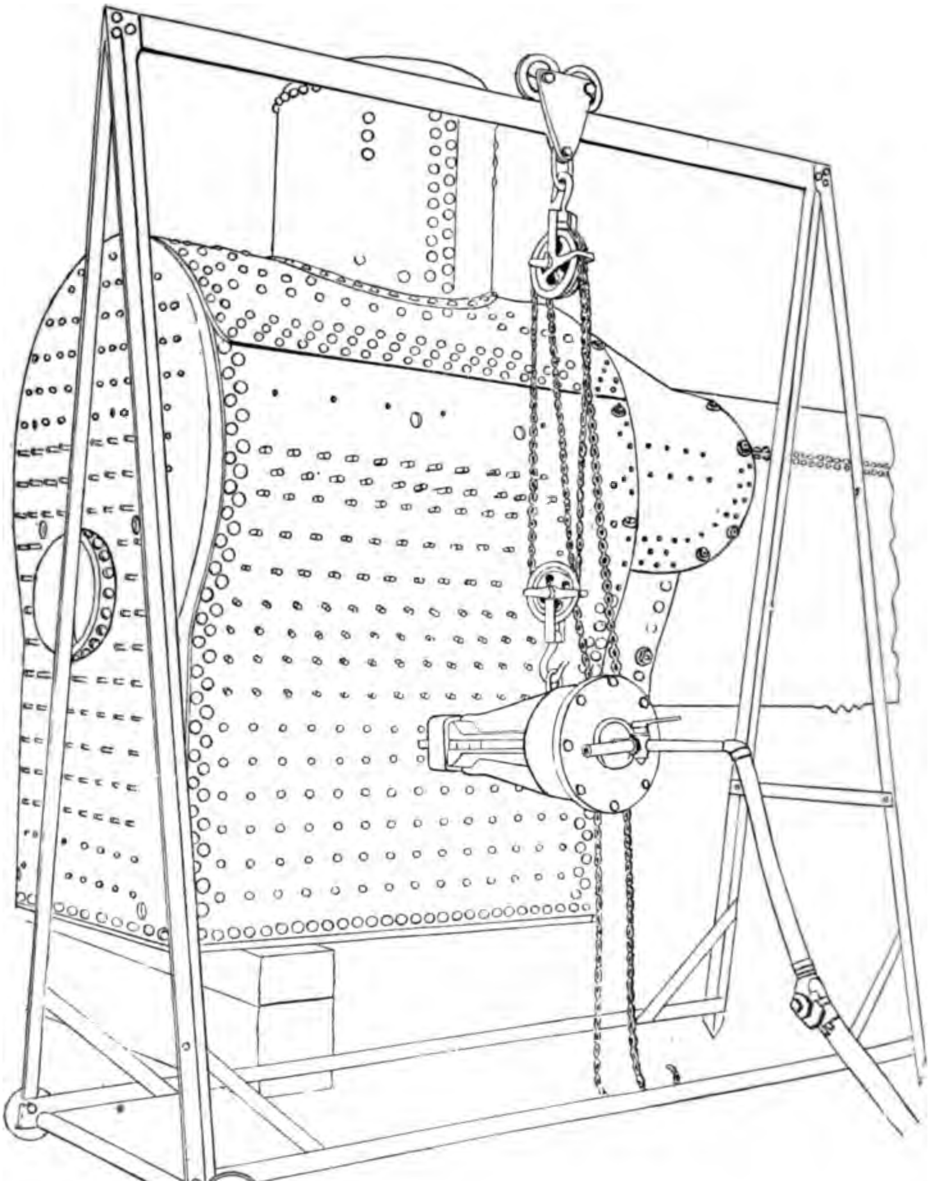
This machine was designed for tapping holes for stay-bolts, screwing bolts to place, for drilling and reaming holes of all kinds, and, in fact, the machine is used for a great many other purposes. On account of its lightness a boy can operate it very readily. The machine runs at a speed of 175 revolutions per minute, and, at a working pressure of 90 lbs., it develops 2½ horse power.

In addition to the above, this machine will roll out a complete set of 200 2-inch boiler tubes, including both ends, in five hours' time. The old method of operating rolls, with hand hammer and lever, not only requires more than double the length of time to roll flues, but is also very destructive on rollers and pins.

The total weight of this machine, in working order, is 28 lbs.

Code Word. Fuscator.

Price, $ ....



STAY-BOLT CUTTER.

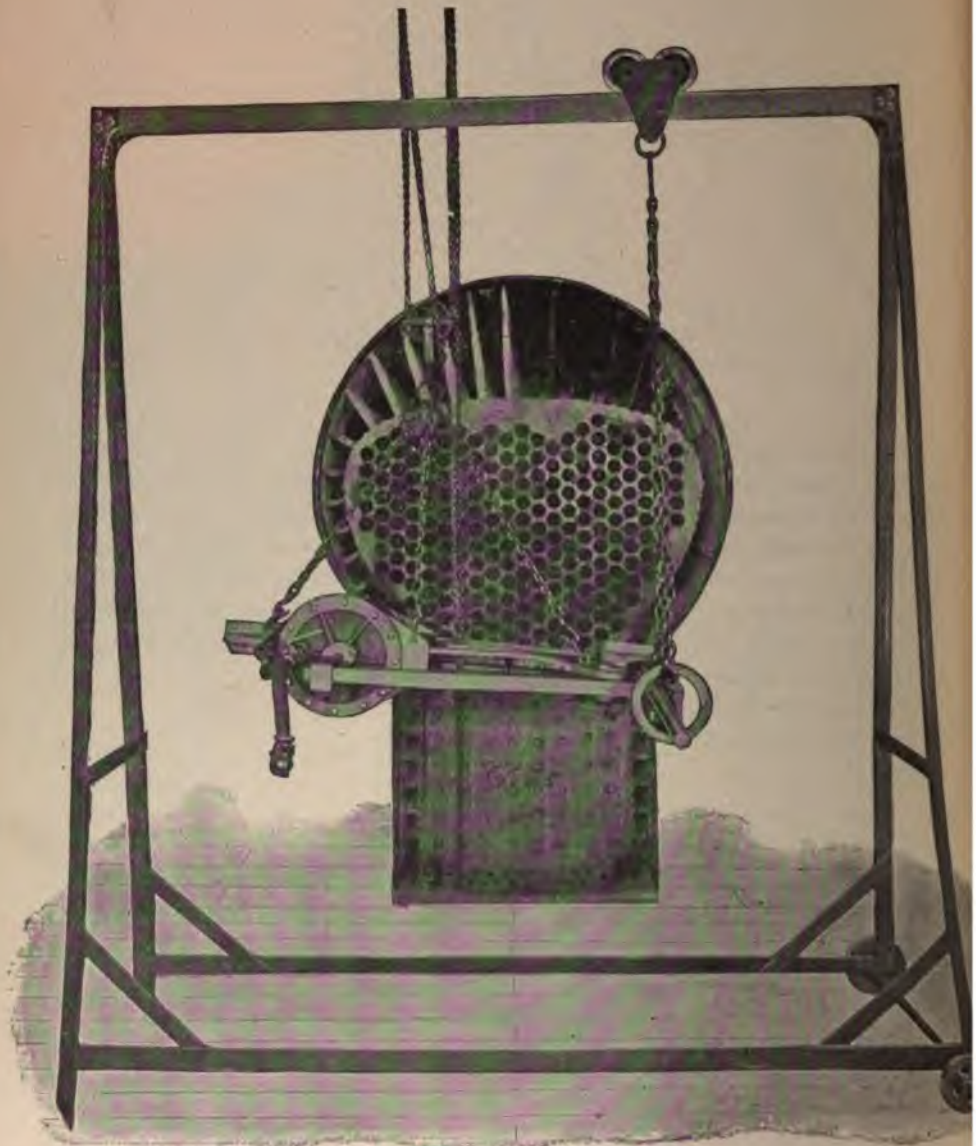
STAY-BOLT CUTTER.

This machine was designed for the purpose of cutting off the ends of stay-bolts after they re been screwed to place in the fire-box of boiler. The machine consists of a cylinder and me combined; diameter of cylinder 15 inches; is operated by either steam or compressed air, ferably the latter; and with a working pressure of 90 lbs. will cut off stay-bolts ranging in meter from ¾-inch to 1¼ inches, at the rate of 1,200 per hour, cutting them off the proper stance from the sheet to allow for heading over. By cutting the bolts with this machine, it es not loosen them in the plates as is done when cut off by the old method of hammer and isel. One man (laborer) is all the help required to handle this machine.

Total weight of machine, in working order, 450 lbs.

Code Word, Fuscaturi.

Price, $ ....



STAY-BOLT BREAKER.

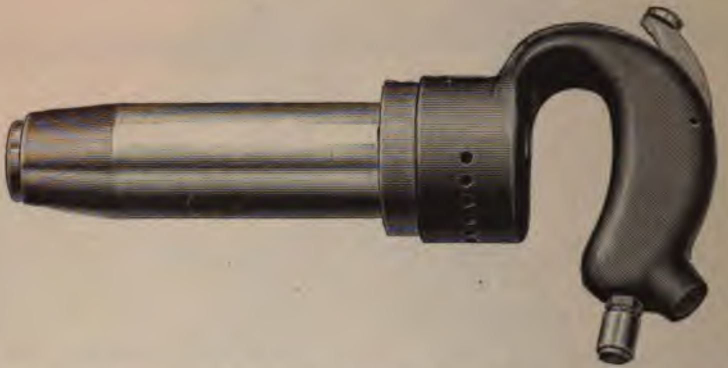
STAY-BOLT BREAKER.

This machine was designed for the purpose of cutting out old fire-boxes. One man and a boy (to handle valves) can operate same. It is capable of cutting out the largest size fire-box in ten hours. The cut on opposite page shows a boiler on which the fire-box is separated from the shell or forward portion of boiler, as we believe this to be the most economical way; but where the other method of taking out fire-boxes is used, by taking out the door sheet and back head the machine can be operated just as well. To begin work, cut out the sides first; then take your two heads, which have not been separated, and place on two horses, under crane, and apply machine and shearing hook. A simple split nut, with cam movement, is used on the threaded end of the shear hook. The device is very simple, saves hard work and will pay for itself in a very short time in a shop doing any amount of new fire-box work.

The weight of machine, in working order, is 800 lbs.

Code Word. Fuscavi.

Price, $ ....



THE "NEW BOYER" PNEUMATIC HAMMER.

This tool is designed for boiler calking, chipping steel castings and metals in other forms, stone cutting and kindred work. Air at any pressure, from 20 to 100 pounds or more to the square inch, will operate it, but for usual work a pressure of not less than 80 pounds for the metal working sizes and 35 to 50 pounds for the stonecutters' sizes is recommended.

The hose between the hammer and the supply main should be ample in size, and the section directly connected with the hammer should not exceed 10 to 12 feet in length. If a greater length of hose is required, a larger section may be attached to that coupled with the tool. Half-inch garden hose will answer for this purpose. Three-eighths inch hose (cloth-inserted rubber tubing) is suitable for all sizes for the section coupled with the hammer.

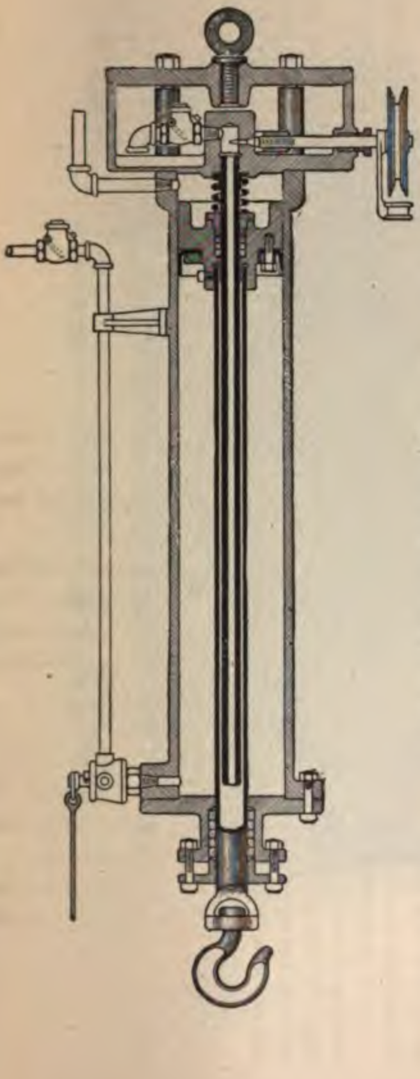
Lubricate with a good light oil (such as "Valvoline" sewing machine oil.)

The chisel, or tool, should be square and accurately made at the end which enters the hammer, so that it will fit freely, yet not loose enough to have unnecessary play: and, what is of equal importance, the axis of the portion that enters the hammer should be in line with the body of the tool, so the blow will be communicated directly to the point without springing.

These hammers will not operate if the tool shank is not inserted its full depth into the socket, because the shoulder of the tool must make a close joint with the abutting end of the sleeve, to confine the air within the cylinder.

Code Word, Fuscellino.

AIR HOISTS.

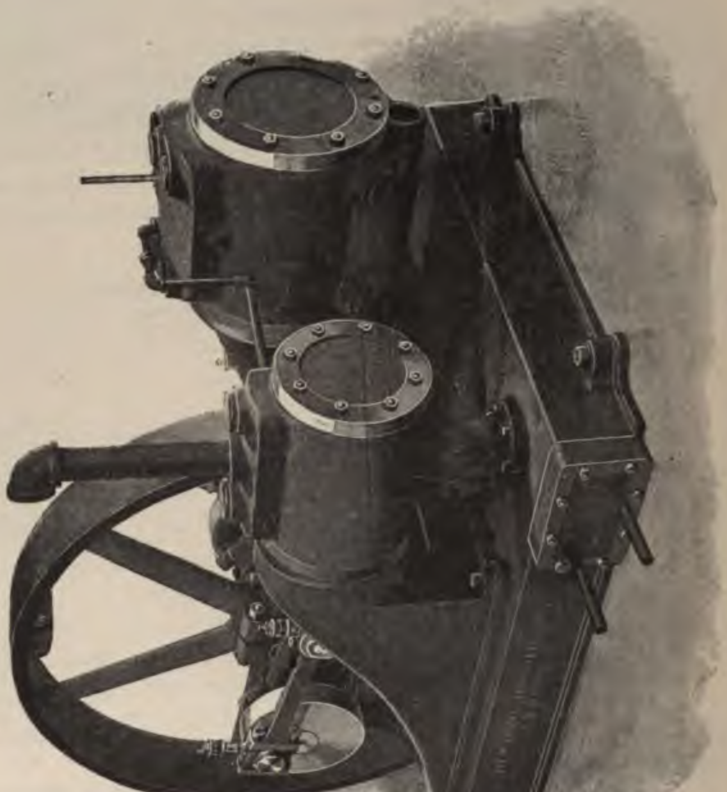


The space above the piston of these air hoists is intended to be filled with oil, which, as the load is raised, is allowed to escape through a suitable valve. The speed of the hoists can be easily regulated by opening or closing this valve, and there is no danger of knocking the top of the cylinder out in case the load is suddenly released. Moreover an extremely steady motion of the hoist is assured.

SPECIFICATIONS.

Code Word.	Diam.	Lift.	Estimated Capacity.
Fusilero........	3	4′	400 lbs
Fusilibus......	4	4′	720 lbs
Fusilien	5	4′	1140 lbs
Fusillade......	6	4′	1680 lbs
Fusiller.........	7	4′	2280 lbs
Fusilliez.......	8	4′	3000 lbs
Fusillions	9	4′	3780 lbs
Fusinae...	10	4′	4680 lbs
Fusion..........	12	4′	6780 lbs
Fusionamos..	14	4′	9180 lbs
Fusionando..	16	4′	12060 lbs
Fusionar.......	18	4′	15240 lbs
Fusionaron...	20	4′	18840 lbs
Fusionases....	22	4′	22800 lbs
Fusioneis	24	4′	27120 lbs
Fusionibus ...	26	4′	31800 lbs
Fusionismo..	28	4′	36900 lbs
Fusionista....	30	4′	42360 lbs

Capacities are calculated by multiplying area of cylinders by 80 pounds air pressure and deducting 25 per cent. for friction, etc. As the friction, and all losses, especially in large sizes, is very much less than 25 per cent., the capacities are all safely within actual performance.



DUPLEX BELT DRIVEN AIR COMPRESSOR.

DUPLEX BELT DRIVEN AIR COMPRESSOR,

WITH COMPOUND AIR CYLINDERS AND INTER-COOLER IN BASE.

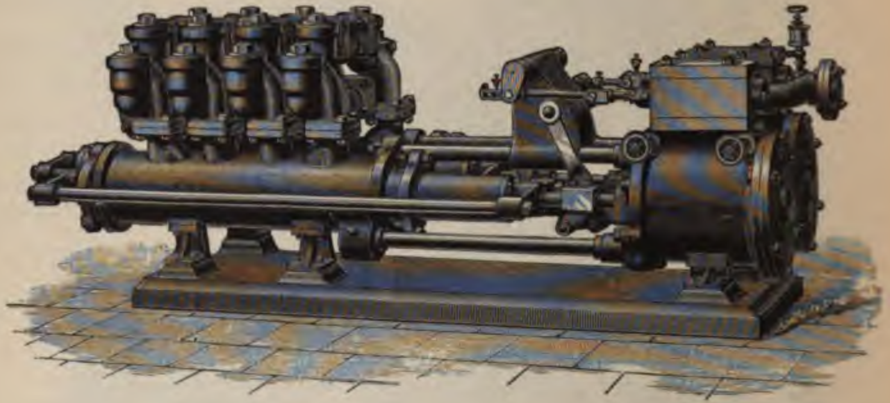
The Duplex Air Compressor illustrated on the opposite page is of a very compact and self-contained type. The crosshead is of cast iron with phosphor bronze shoes arranged for taking up wear. The connecting rods are of forged iron of the marine rod pattern on crank and solid end on crosshead, with bronze boxes. The crank shaft is of the best hammered steel with disc crank at each end. Each compressor is provided with one belt pulley wheel of ample size and weight for the duty to be performed, hub bored and key-seated to fit shaft.

The air cylinders are provided with a very simple form of vertical lift inlet and discharge valves. The air cylinders and heads are provided with water jackets, and a suitable pipe inter-cooler is placed in the bed plate and connected to both air cylinders, so that the air in passing from the low-pressure to the high-pressure air cylinder is thoroughly cooled.

Automatic sight feed lubricators are provided for all cylinders.

SPECIFICATIONS.

Code Word.	Size of Cylinders.			Revolutions Per Minute.	Cubic Feet Free Air Per Minute.	Air Pressure Designed for	Horse Power.	Size of Pipes.				Size of Pulley.			Floor Space.			Approximate Weight.	
	Diameter.		Stroke.					Air Inlet.	Air Discharge.	Circulating Water.	Drip.	Diameter of Pulley.	Face.	Diameter of Shaft.	Length Over All.	Width Over All.	Height Above Foundation.	Pulley.	Air Compressor Complete.
	Low Pressure Air.	High Pressure Air.																	
Fusipore.......	10″	7″	6″	150	80	80-100	12–14	2½″	2½″	¾″	½″	4′ 3″	4″	3½″	6′ 3″	4′ 6″	4′ 0″	800	3000
Fusivel........	14″	9″	8″	150	210	80-100	32–36	3″	2½″	¾″	½″	5′ 0″	6″	4½″	7′ 2″	5′ 3″	4′ 10″	1300	5100
Fusolana.....	16″	10″	10″	150	342	80-100	52–58	3½″	3″	¾″	½″	6′ 0″	8½″	5½″	8′ 7″	5′ 9″	5′ 0″	2200	7800
Fusoliera	18″	12″	12″	150	519	80-100	78–88	4″	3½″	1″	½″	6′ 3″	14″	6″	9′ 10″	6′ 9″	5′ 6″	3300	10500



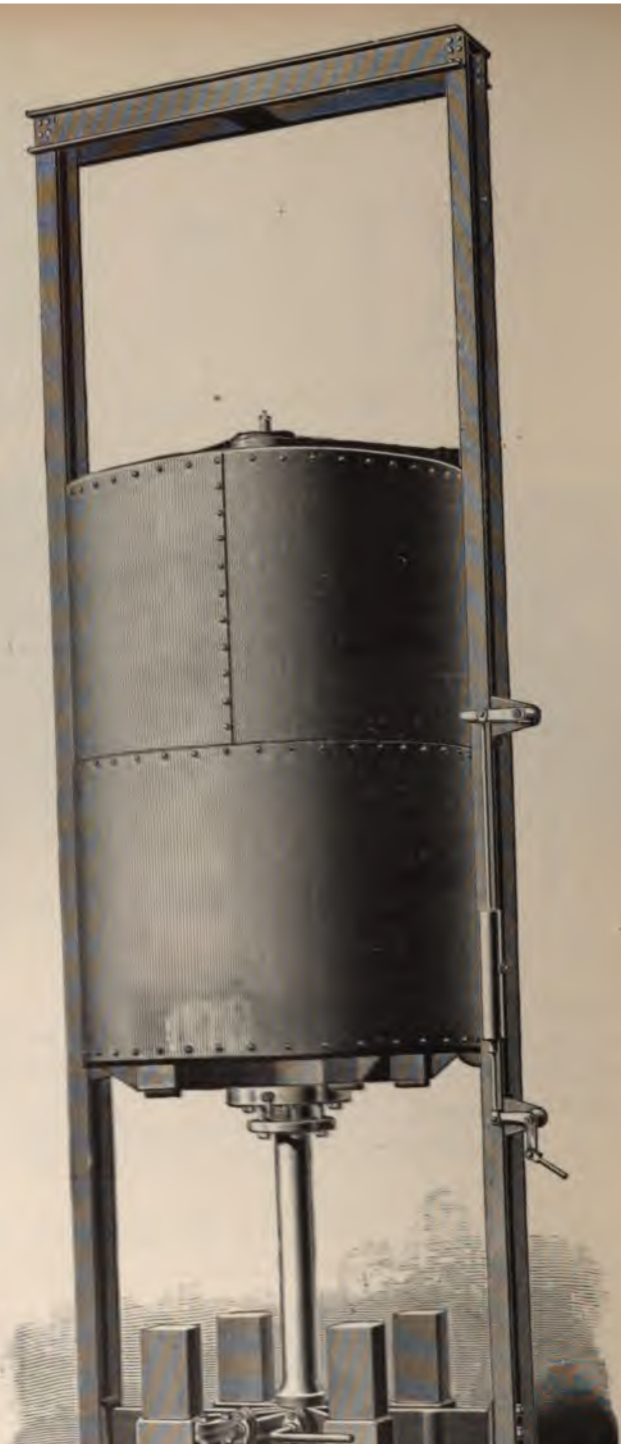
PRESSURE PUMPS.

The cut shows the general type of Pressure Pump used with the Hydraulic Machinery described on the previous pages. It consists of four single-acting Plungers, having external adjustable packings, which work into the ends of cylinders having central partitions. The valve boxes are subdivided into small chambers, easily accessible and capable of resisting heavy pressure. The standard sizes are given in the list opposite.

PRESSURE PUMPS.

SPECIFICATIONS.

Code Word.	Diameter of Steam Cylinders.	Diameter of Water Plungers.	Length of Stroke.	Displacement in Gallons per Stroke of One Plunger.	Proper Strokes per Minute of One Plunger, varying with Kind of Work and Pressure.	Gallons Delivered per Minute by the Four Plungers at Stated Number of Strokes.	Sizes of Pipes for Short Lengths. To be Increased as Length Increases.			
							Steam Pipe.	Exhaust Pipe.	Suction Pipe.	Dis-charge Pipe.
Furolle.........	4½"	¾"	4"	.007	60 to 100	.8 to 1.4	½"	¾"	½"	½"
Furoncello...	4½"	2½"	4"	.08	60 " 100	9. " 16.	½"	¾"	1½"	1¼"
Furoncolo.. ...	5¼"	¾"	5"	.009	55 " 95	1. " 1.7	¾"	1¼"	½"	½"
Furonis.........	5¼"	3"	5"	.14	55 " 95	15. " 26.	¾"	1¼"	2"	1½"
Furono	6"	¾"	6"	.01	50 " 90	1. " 1.8	1"	1½"	½"	½"
Furore	6"	3½"	6"	.25	50 " 90	25. " 45.	1"	1½"	2"	1½"
Furriel	7½"	¾"	6"	.01	50 " 90	1. " 1.8	1½"	2"	½"	½"
Furrily	7½"	4"	6"	.32	50 " 90	32. " 57.	1½"	2"	3"	2½"
Furrina.........	7½"	2¼"	10"	.17	40 " 75	13. " 25.	1½"	2"	2½"	2"
Furrings.......	9"	3"	10"	.30	40 " 75	24. " 45.	2"	2½"	2½"	2"
Furrows........	10"	3¾"	10"	.48	40 " 75	38. " 72.	2"	2½"	2½"	2"
Furtacor.. ...	12"	4½"	10"	.69	40 " 75	55. " 104.	2½"	3"	4"	3"
Furtafogo	14"	5"	10"	.85	40 " 75	68. " 128.	2½"	3"	4"	3"
Furtapasso....	16"	5½"	10"	1.01	40 " 75	80 " 150.	2½"	3"	4"	3"
Furthered.....	18½"	6"	10"	1.20	40 " 75	95. " 180.	3"	3½"	5"	4"
Furthering ...	20"	7"	10"	1.66	40 " 75	130. " 250.	4"	6"	5"	4"
Furthest	25"	7¾"	10"	2.01	40 " 75	160. " 300.	5"	7"	5"	4"
Furtificae	10"	2¼"	15"	.25	30 " 65	15. " 32.	2"	2½"	2½"	2"
Furtificis	12"	3¾"	15"	.70	30 " 65	42. " 90.	2½"	3"	2½"	2"
Furtivas	14"	4½"	15"	1.00	30 " 65	60. " 130.	2½"	3"	4"	3"
Furtively......	17"	5½"	15"	1.50	30 " 65	90. " 195.	3"	3½"	4"	3"
Furtivo.........	20"	6½"	15"	2.10	30 " 65	125. " 270.	4"	5"	5"	4"
Furuncle.......	25"	7¾"	15"	3.00	30 " 65	180. " 390.	5"	7"	5"	4"



ACCUMULATOR.

ACCUMULATORS.

The cut represents a standard form of accumulator, furnished with guide-frame and wrought-iron weight-case. The cylinder extends up through the center of the case, the plunger being stationary on the base plate and the water passing through it into the cylinder. The pump is connected automatically with the accumulator, so that the steam is cut off when it rises to the top of its stroke. A safety valve is also provided on top of cylinder to prevent any possibility of accident.

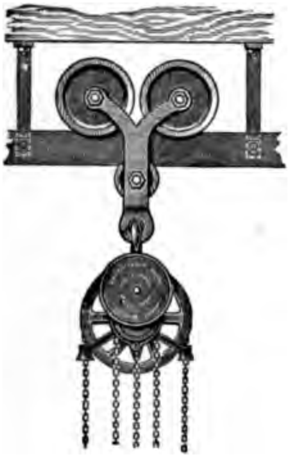
The weight-case is usually loaded with broken stone, slag or other convenient material of no cost. Where it is desired, we make accumulators with cast-iron cheese weights. These accumulators are made in a large number of sizes, with capacity to suit the number and kind of machines to be operated.

Code Word for type, Fusorio.

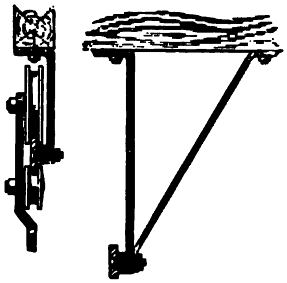
PART XXIII.

CRANES AND HOISTS.

Short Hangers.



Braced Hangers.

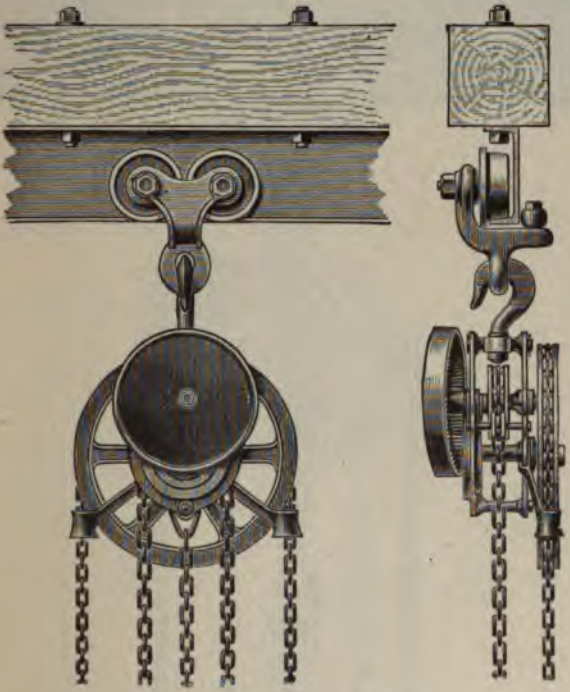


OVERHEAD TRAMWAYS.

SINGLE TRACK RAILWAY WITH FLAT-RAIL TRACK.

PRICE LIST.

Code Word.	Capacity in Pounds.	Largest Distance Center to C of Hangers.	Price of Rail Per Foot.	Price of Short Hanger, Each.	Price of Trolley.	Price of Each Curve.
Fundivel......	500	8′ 0″	$ .30	$ .90	$ 9.75	$ .75
Fundort........	1,000	5′ 0″	.40	1.00	10.50	.75
Fundorten....	1,500	6′ 0″	.50	1.15	11.25	1.10
Fundorum....	2,000	6′ 6″	.65	1.40	12.00	1.50
Fundulum....	3,000	5′ 0″	.75	1.70	13.50	1.50
Fundura.......	4,000	5′ 6″	.90	2.00	15.00	1.85
Funebre	6,000	5′ 0″	1.05	2.40	17.25	2.25
Funebrial	8,000	5′ 0″	1.20	2.75	18.75	3.00
Funebris......	10,000	4′ 0″	1.30	3.35	20.25	3.00

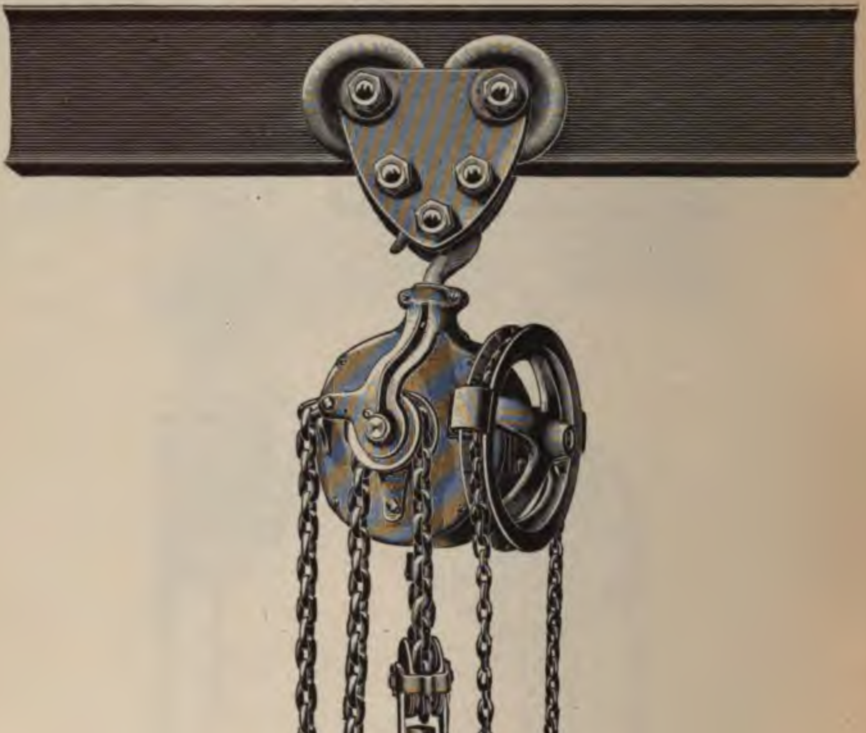


OVERHEAD TRAMWAY

WITH CHANNEL BEAM RAIL.

PRICE LIST.

Code Word.	Capacity in Pounds.	Largest Distance between Hanger Bolts.	Price Per Foot.	Price of Trolley.	Price of Each Curve.
Funerals	500— 1,000	5′ to 6′	$ .35	$ 9.00	$1.50
Funerammo ..	2,000— 3,000	"	.50	11.25	2.25
Funerarono ...	4,000— 6,000	"	.80	18.00	3.00
Funerassi	8,000—10,000	"	1.10	22.50	4.50



THE STYLE "A" STANDARD.

STANDARD, STYLE A,

LIST OF HOISTS.

Code Word.	Capacity in Pounds.	Price Complete with Chain.	Height of Lift.	Weight Complete with Chain.	Price for Each Foot of Extra Lift.	Shortest Distance Between Hooks.
Furfasse.......	500	$..................	8'	30 lbs.	$..................	16"
Furfatore......	1,000	$..................	8'	50 lbs.	$..................	18"
Furfavamo....	2,000	$..................	8'	65 lbs.	$..................	21"
Furfavate.	3,000	$..................	8'	85 lbs.	$..................	24"
Furferanno...	4,000	$..................	9'	120 lbs.	$..................	28"
Furferebbe ..	6,000	$..................	10'	175 lbs.	$..................	30"
Furferemo.....	8,000	$..................	10'	240 lbs.	$..................	32"
Furferesti.......	10,000	$..................	12'	300 lbs.	$..................	34"
Furfero	12,000	$..................	12'	350 lbs	$..................	3' 0"
Furfurem.	16,000	$..................	12'	450 lbs.	$..................	3' 3"
Furfureos.....	20,000	$..................	12'	650 lbs.	$..................	3' 9"
Furfuris........	24,000	$..................	12'	730 lbs	$..................	4' 0"
Furfurol	30,000	$..................	12'	850 lbs.	$..................	4' 3"

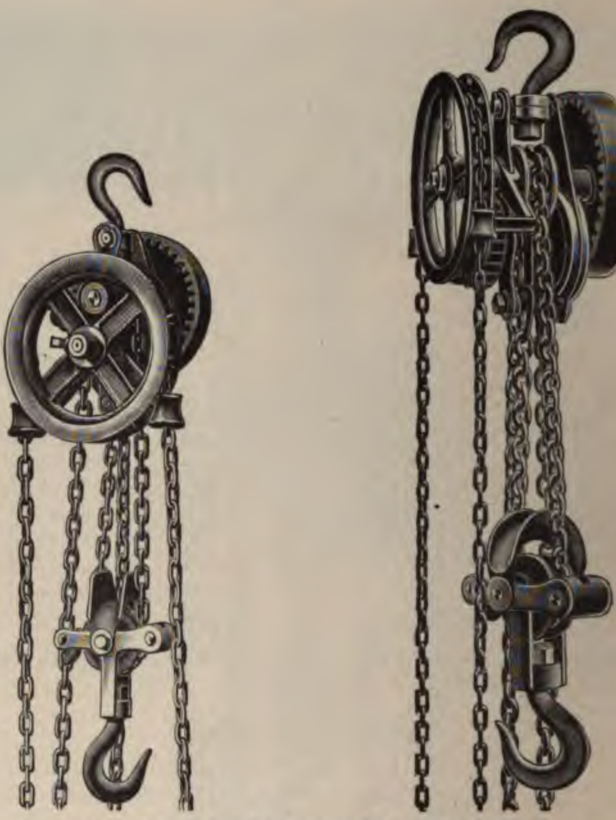
NOTE.—Figures in third column give height to which blocks with regular length of chain will raise the load from the floor on which the operator stands.

LIST OF TROLLEYS.

Code Word.	"A" Plain Trolleys	Price.	Code Word.	"B" Geared Trolleys	Price.
Furgault.......	1 ton capacity	$..................	Furiandi.......	1 ton capacity	$..................
Furgon..........	1½ tons capacity	$..................	Furiandos.....	1½ ton capacity	$..................
Furiabit.........	2 tons capacity	$..................	Furiarent.......	2 tons capacity	$..................
Furiabitis.....	3 tons capacity	$..................	Furiatile..	3 tons capacity	$..................
Furiabunt.....	4 tons capacity	$..................	Furiatilis.......	4 tons capacity	$..................
Furiaccia......	5 tons capacity	$..................	Furiaturum ..	5 tons capacity	$..................
Furialiter	6 tons capacity	$..................	Furiaverat....	6 tons capacity	$..................

Note. These trolleys are designed to travel on lower flanges of I beams. They are built with four single flanged wheels which are turned and run on large steel pins in anti-friction roller bearings.

In the geared trolleys, which are preferred when it comes to heavy speedy movements and more or less heavy loads, the length of hand chain is calculated for a beam twelve feet above the floor level. For every lineal foot of height add 40 cents to above price.



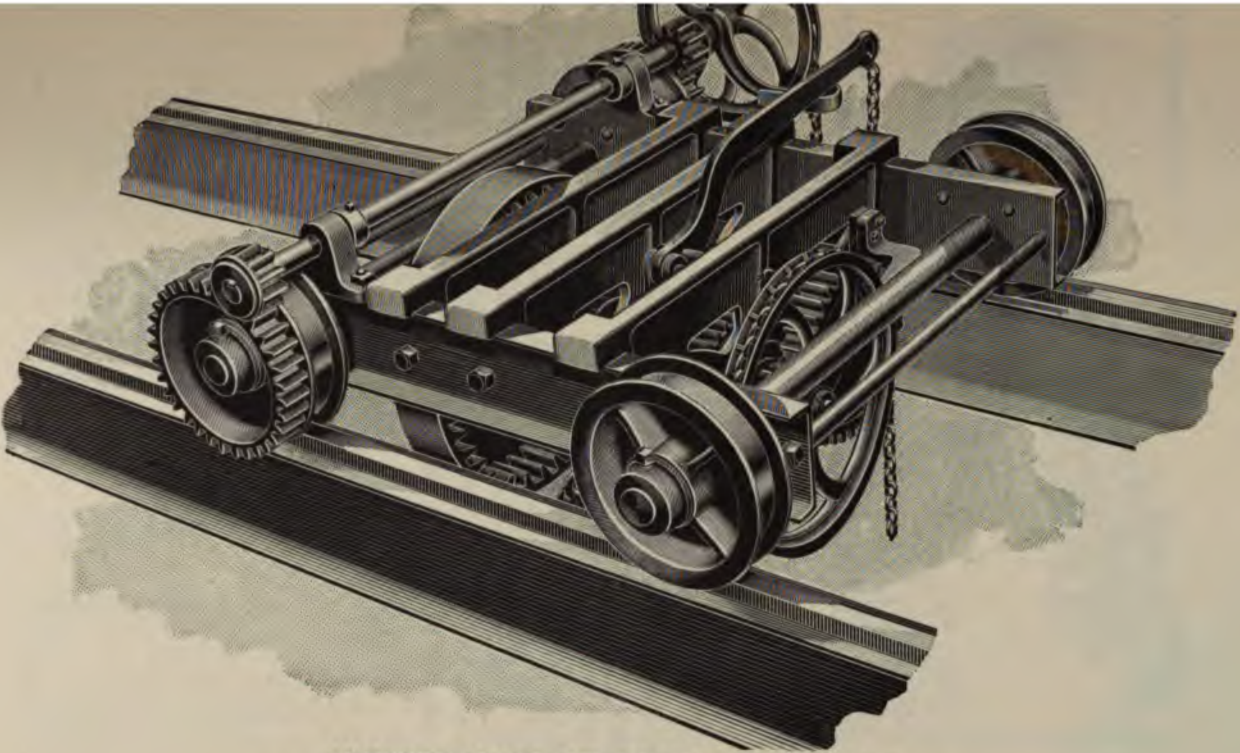
PORTABLE CHAIN HOISTS.

Single geared Hoist for sizes up to 1½ tons capacity.

Double Geared Hoist for sizes of 2 tons and over.

PRICE LIST.

Code Word.	Capacity of Hoist in Lbs.	Price, Complete with Chain.	Height of Lift.	Weight, Complete with Chain.	Price for Each Foot of Extra Lift.	Shortest Distance Between Hooks.
Furatim.......	500	$................	8′	25 lbs.	$................	19″
Furatori.......	1,000	$................	8′	40 lbs.	$................	21″
Furatrici	2,000	$................	8′	61 lbs.	$................	24″
Furbaccio	3,000	$................	8′	88 lbs.	$................	28″
Furbelow......	4,000	$................	9′	130 lbs.	$................	32″
Furberia.......	6,000	$................	10′	175 lbs.	$................	34″
Furbesco......	8,000	$................	10′	240 lbs.	$................	34″
Furbo..........	10,000	$................	12′	300 lbs.	$................	3′ 0″
Furcate	12,000	$................	12′	345 lbs.	$................	3′ 4″
Furcation	16,000	$................	12′	400 lbs.	$................	3′ 9″
Furcaire	20,000	$................	12′	645 lbs.	$................	4′ 0″
Furbishes.....	30,000	$................	12′	830 lbs.	$................	4′ 6″



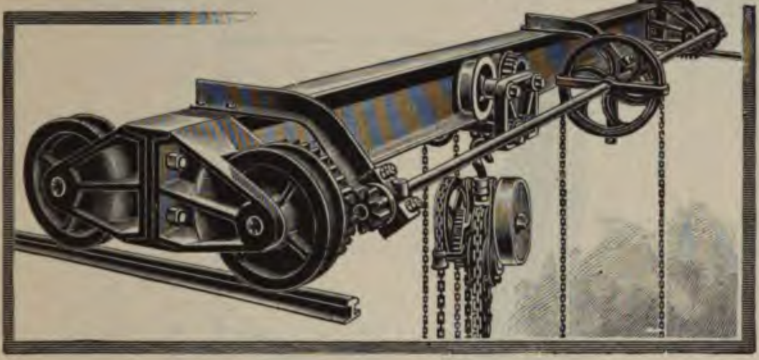
COMBINED HOIST AND TROLLEY, STYLE "B."

See Page 370.

COMBINED HOIST AND TROLLEY.

STYLE "B."

The illustration on page 369 shows a style of trolley for service on a traveling crane and has the hoist mounted in the trolley, not hung below it, thus giving more head room. The gearing and the bearings are kept larger than is possible in the portable form of hoists. An automatic brake will hold the load stationary at any point of the lift. The shafts and axles run in anti-friction roller bearings, thus securing the highest efficiency possible. The hoist is also provided with a break lever so that the load can be lowered more rapidly than could be done by pulling backward on the hand chain. In other respects the trolley is similar to the one shown on the traveling crane as per cut on page 372, has four double flanged wheels and is provided with hand wheel and gearing for driving it across the bridge.



HAND TRAVELING CRANE

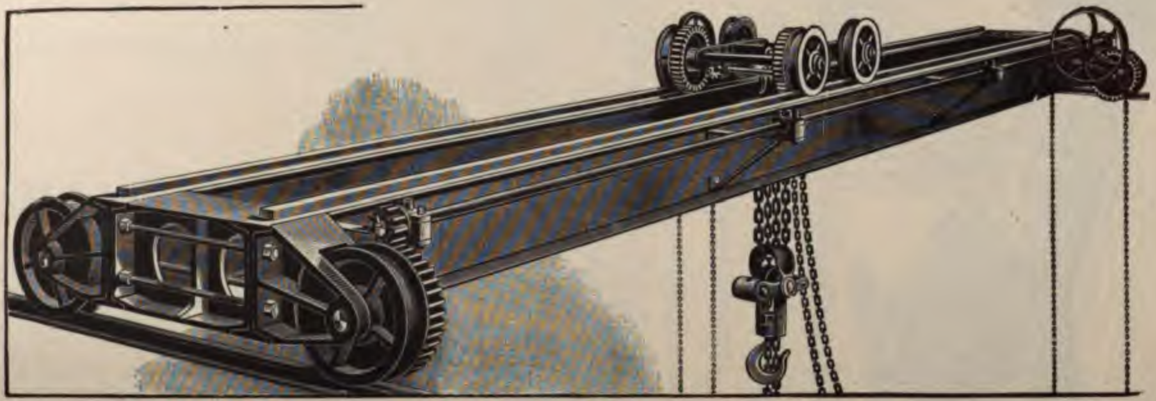
WITH SINGLE I BEAM.

With geared trolley to be worked from floor by an endless hand chain. Bridge is made of single I Beam with trolley running on lower flanges of same. All motions are effected by endless hand chains.

Bridge and trolley wheels are turned in the grooves, have anti-friction roller bearings and work very freely without a jar. These cranes are very strong and durable and cause no vibration.

SPECIFICATIONS.

Code Word.	Capacity of Crane.	Span.	Lift.	Shortest Distance from Top of Rails to Highest Point of Trolley.	Shortest Distance from Top of Trolley to Hook.	Prices Complete With Hoist.	Extra Lift Per Foot.
Fungato	2 tons	12' to 14'	14'	14"	40"	$............	$..........
Funge	2 "	16' " 19'	14'	16"	40"	$............	$..........
Fungebaris...	2 "	20' " 24'	14'	16"	40"	$............	$..........
Fungebatur...	2 "	25' " 30'	14'	19½"	40"	$............	$..........
Fung eerde....	3 "	12' " 15'	14'	16"	45"	$............	$..........
Fungendis....	3 "	16' " 19'	14'	16"	45"	$............	$..........
Fungentem...	3 "	20' " 24'	14'	19½"	45"	$............	$..........
Fungheto	3 "	25' " 30'	14'	19½"	45"	$............	$..........
Fungible	4 "	12' " 15'	15'	19"	48"	$............	$..........
Fungico........	4 "	16' " 19'	15'	19"	48"	$............	$..........
Fungina........	4 "	20' " 24'	15'	19½"	48"	$............	$..........
Fungitur.	5 "	12' " 14'	15'	19"	50"	$............	$..........
Fungor	5 "	15' " 18'	15'	19½'	50"	$............	$..........
Fungosity.....	5 "	19' " 22'	15'	19½"	50"	$............	$..........

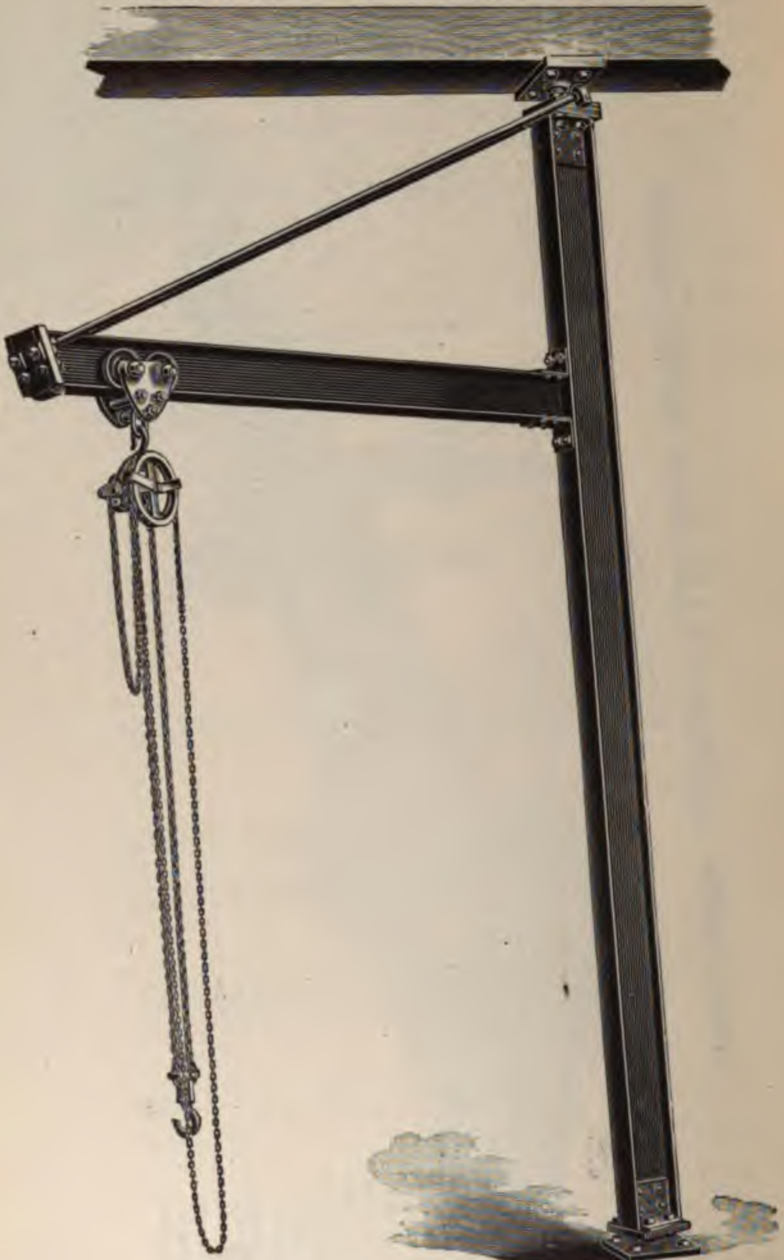


HAND POWER TRAVELING CRANE, WITH DOUBLE I BEAMS.

HAND POWER TRAVELING CRANE, WITH DOUBLE I BEAMS.

SPECIFICATIONS.

Code Word.	Capacity of Crane.	Span.	Lift.	Shortest Distance from Top of Rails to Highest Point of Trolley.	Shortest Distance from Top of Trolley to Hook.	Prices Complete With Hoist.	Extra Lift Per Foot.
Fungoso...........	4 tons	21' to 25'	15'	25½"	36"	$..................	$..................
Fungous.	4 tons	26' " 30'	15'	28½"	36"	$..................	$..................
Fungulos..............	4 tons	31' " 35'	15'	28½"	36"	$..................	$..................
Funibus................	5 tons	20' " 25'	15'	25½"	40"	$..................	$..................
Funicella.............	5 tons	26' " 30'	15'	28½"	40"	$..................	$..................
Funichio..............	5 tons	31' " 35'	15'	33½"	40"	$..................	$..................
Funicolare	6 tons	16' " 19'	16'	25½"	44"	$..................	$..................
Funiculo	6 tons	20' " 23'	16'	28½"	44"	$..................	$..................
Funiforme.	6 tons	24' " 27'	16'	28½"	44"	$..................	$..................
Funingue...............	6 tons	28' " 31'	16'	33½"	44"	$..................	$..................
Funkelten..............	6 tons	32' " 35'	16'	33½"	44"	$..................	$..................
Funkite	8 tons	16' " 19'	16'	30½"	48"	$..................	$..................
Funklig	8 tons	20' " 23'	16'	30½"	48"	$..................	$..................
Funnily..................	8 tons	24' " 27'	16'	35½"	48"	$..................	$..................
Fuocara	8 tons	28' " 31'	16'	35½"	48"	....	$..................
Fuorche	8 tons	32' " 35'	16'	35½"	48"	$..................	$..................
Furabor..................	10 tons	16' " 19'	16'	30½"	50"	$..................	$..................
Furacibus	10 tons	20' " 23'	16'	35½"	50"	$..................	$..................
Furacity	10 tons	24' " 28'	16'	35½"	50"	$..................	$..................
Furanter..............	10 tons	29' " 34'	16'	35½"	50"	$..................	$..................



SWING CRANE, WITH TRAVELING HOIST, STYLE "D."

SWING CRANES WITH TRAVELING HOIST.

STYLE "D."

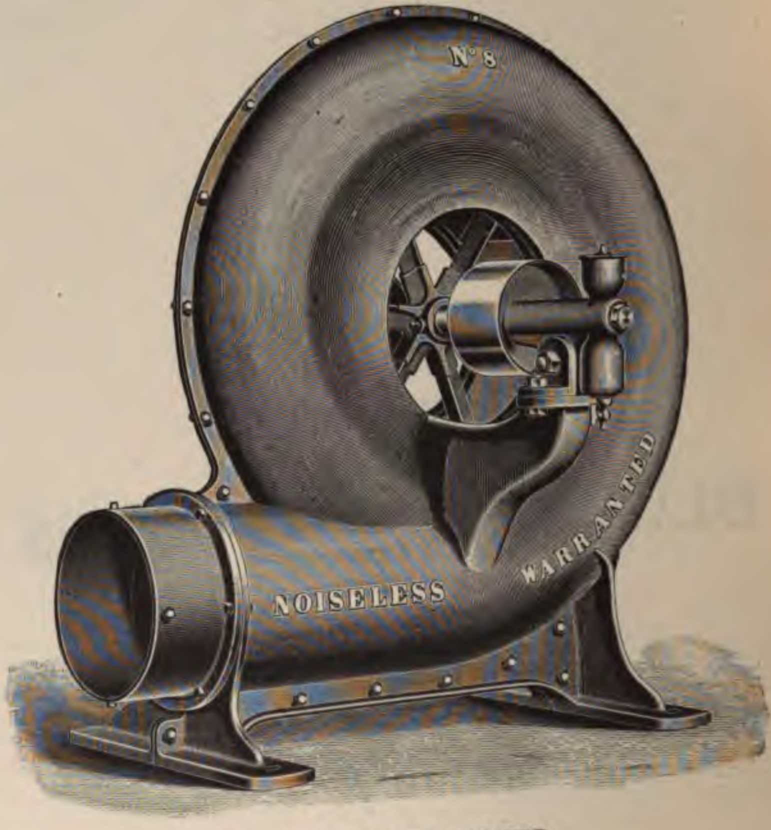
Mast and Jibs are made of I beams, the four-wheel trolley running on the lower flanges of the Jib and carrying the chain block. The load is always self-sustained by the automatic action of the patent safety break so that the hand chain may at any time be "let go" in which case the load will remain suspended and will not run down.

SPECIFICATIONS.

Code Word.	No.	Capacity.	For Hoist of or less.	For Radius or Less.	Price Complete with Trolley and Hoist.	For Each Add'l Foot of Hoist.
Forioso	1	1000 lbs.	10′	10′	$	$.....................
Furlong.........	2	1500 lbs.	10′	10′	$..........	$....................
Furlough......	3	2000 lbs.	12′	12′	$........	$............. ....
Furmint..	4	3000 lbs.	12′	12′	$	$.................. ...
Furnaceis. ...	5	4000 lbs.	12′	12′	$..................	$ ....

PART XXIV.

BLOWERS AND FORGES.



STEEL PRESSURE BLOWER.

STEEL PRESSURE BLOWERS

FOR CUPOLA FURNACES AND FORGES.

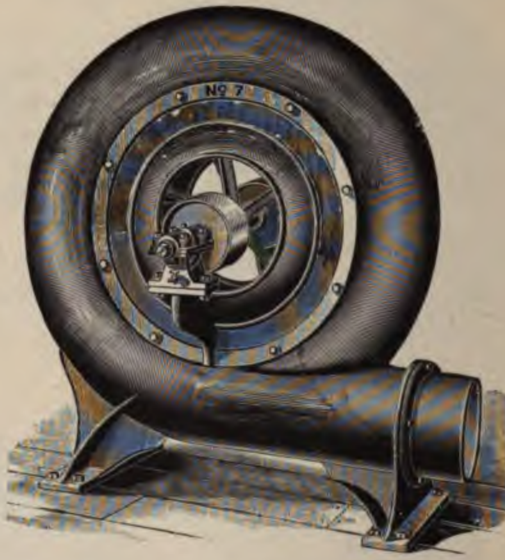
Great pains have been taken to simplify the construction of these Blowers, and to strengthen all parts. Any machinist of ordinary skill will readily understand how to adjust, keep in order and repair them. They are built heavier and stronger than formerly, particularly in the running parts which are most subject to wear. The fact that these Blowers have been run continuously for twenty-five to thirty years, without any repairs whatever, is sufficient evidence of their durability.

Attention is called to the journal boxes, which contain many new and useful improvements over the old ones. Duplicate sets of these journals will be furnished to purchasers desiring them, at a small advance above cost.

SPECIFICATIONS.

Code Word.	No. of Blower.	Outside Diam. of Outlet.	Diam. of Pulley.	Face of Pulley.	Number of Pulleys on Blower.	Price.
Ganga	0000	2¾"	1⅞"	1⅜"	Nos. 0000 to 3 inclusive have only one pulley.	$............
Gangabis	00	3½"	2⅝"	1⅞"		$............
Gangamon	0	4"	3"	2⅛"		$............
Gangart	1	4⅞"	3½"	2½"		$............
Gangbett	2	5⅜"	3⅞"	2⅝"		$............
Gangers	3	6¼"	4½"	3"		$............
Gangetidis	4	7⅜"	5"	3½"	Nos. 4 to 10 inclusive have two pulleys.	$............
Gangfisch	5	8⅞"	5¾"	4"		$............
Ganghauer	6	10¼"	6¾"	4½"		$............
Ganghero	7	12"	7⅞"	5¾"		$............
Gangliao	8	13⅞"	9⅛"	6¼"		$............
Gangorra	9	16"	10⅛"	8"		$............
Gangoso	10	18½"	12⅝"	9¼"		$............

When one pulley only is used, it is placed on the right hand, as one faces the outlet, and the Blower is designated as right hand. When desired, the smaller sizes can be fitted with two pulleys. All sizes are regularly built to discharge horizontally at the bottom, but can be built to order to discharge either horizontally at the top, directly upward or directly downward.



STEEL PRESSURE BLOWERS.

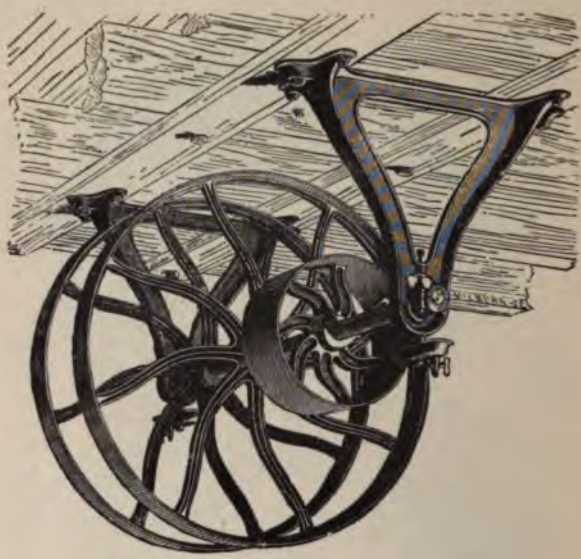
In the construction of these Blast Wheels a high degree of mechanical nicety and skill is called into play. They are now made of the best composition bronze and sheet steel. They are accurately balanced by a process which has been adopted after years of experimenting, and which has been found to be the only system whereby the center of gravity in a rapidly rotating body is brought practically to coincide with its mechanical center, and as nearly as possible a theoretically perfect balance obtained. Every wheel is tested thoroughly and made to run smoothly and without appreciable vibration at the maximum soeed before leaving the works.

STEEL PRESSURE BLOWERS.

SPECIFICATIONS.

Code Word.	Number of Blower.	Height in Inches.	Diam. of Outlet.	Diam. of Pulley.	Face of Pulley.	Diam. of Bearing.	Length of Bearing.	Price with Counter-shaft.
Gangzug	1	12½″	3⅝″	2⅛″	1¾″	9/16″	3¼″	$ ....
Ganhador......	2	15″	4″	2½″	2¼″	⅝″	3 7/16″	$ ....
Ganhanca .	3	20″	4⅝″	3¼″	2⅝″	¾″	4⅛″	$ ....
Ganhavel......	4	24″	5⅛″	4″	3″	⅞″	4 13/16″	$ .. ..
Ganientis	5	26″	5½″	4½″	3″	1″	5½″	$ ....
Ganitre.........	6	30″	6¼″	4½″	3½″	1⅛″	6 3/16″	$ ....
Ganizes.........	7	35″	7¼″	5″	4½″	1¼″	6⅞″	$ ....
Gannille.........	8	40″	8⅝″	6″	4½″	1⅜″	7 9/16″	$ ....
Gannys	9	45″	10″	7″	5″	1½″	8¼″	$ ....
Ganoga	10	56″	12¼″	8″	5¾″	1⅝″	8 15/16″	$ ....
Ganosos	11	65″	16½″	10″	7″	1¾″	9⅝″	$ ....
Ganozze........	11½		18″	10″	8″	1⅞″	10″	$ ....
Gansette.......	12		20″	12″	8″	2″	11″	$ ....

Nos. 1 to 6 Blowers inclusive have one pulley. Nos. 7 to 12 have two pulleys.



COUNTER-SHAFTS FOR STEEL PRESSURE BLOWERS

These counter-shafts are specially designed for driving Steel Pressure Blowers. The shafts and pulleys are properly proportioned for the work, and all built of the best of materials. The shafts are of steel accurately turned to size, the pulleys light but strong, and carefully balanced, and the boxes well babbitted, easily adjustable and provided with oil drip cups.

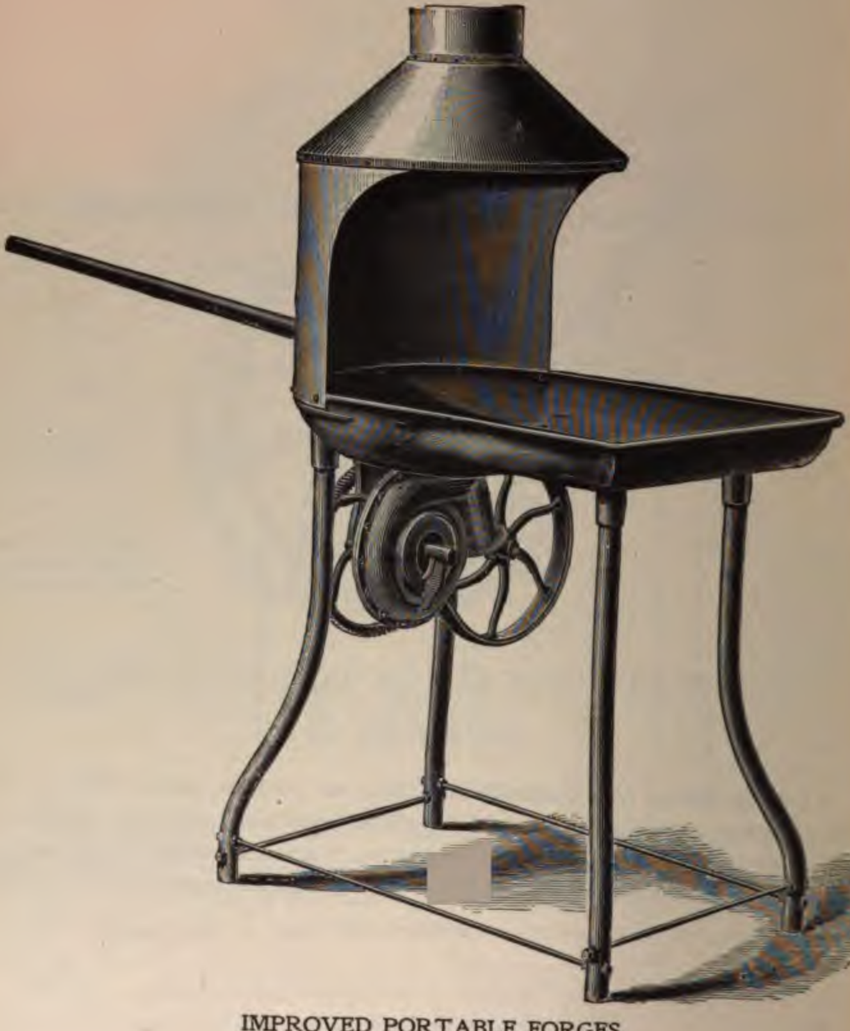
When so ordered, tight and loose pulleys are furnished at a nominal additional price, in place of the usual single pulley driven by main belt.

COUNTER-SHAFTS FOR STEEL PRESSURE BLOWERS.

SPECIFICATIONS.

Code Word.	Number of Blower.	Diameter of Pulley Driving Blower.	Diameter of Pulley driven by Main Belt from Line Shaft.	Diameter of Shaft.	Price.	Number of Pulleys on Blower.
Gantzeit.......	0000					
Ganymede....	00	14"	5½, 6"	⅞"	$...............	Nos. 0000 to 3 inclusive have only one pulley.
Ganymedis...	0	16"	6, 7	1"	$......	
Ganzebout ...	1	18"	7, 8	1⅛"	$...............	
Ganzelever ...	2	21"	7, 8, 10	1¼"	$...............	
Ganzeneb.....	3	24"	8, 10, 12	1½"	$...............	
Gazenhok....	4	28"	10, 12, 14	1⅝"	$......	
Gazenoog.....	5	32"	12, 14, 16	1¾"	$......	Nos. 4 to 10 inclusive have two pulleys.
Ganzenpoel...	6	36"	12, 14, 16, 18	1 15/16"	$...............	
Ganzenvet..	7	42"	14, 16, 18, 20	2 7/16"	$...............	
Ganzepe.......	8, 9	48"	18, 20, 22, 24	2 15/16"	$...............	
Ganzepoot...	9, 10	54"	18, 20, 22, 24	2 15/16"	$...............	

In ordering Blowers with Counter-Shaft pulleys, the purchaser should always be particular to give the speed of main line of shafting and the largest pulley that can be used thereon, so that pulleys may be sent to suit the circumstances. It is desirable to get as much speed as possible from main line. Always use as large a pulley as possible on counter-shaft for main belt.



IMPROVED PORTABLE FORGES.

IMPROVED PORTABLE FORGES.

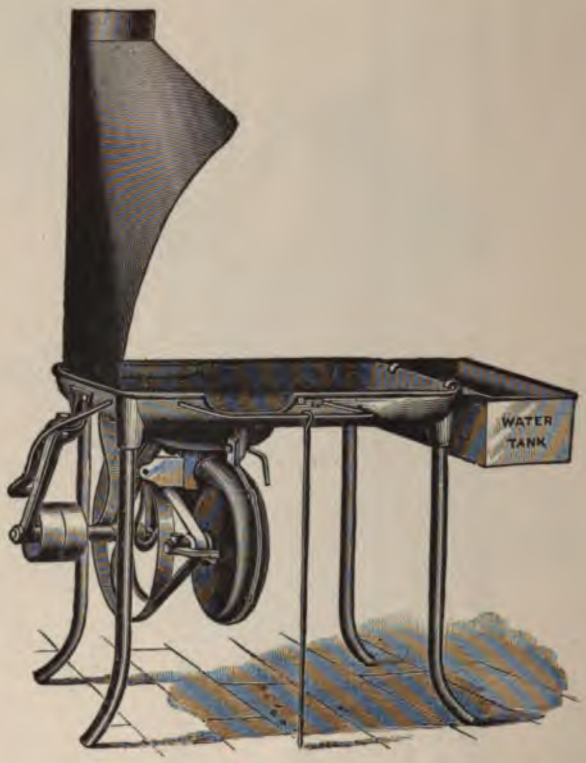
The sheet metal work of these forges is of heavy steel plate, this being much more durable than sheet iron. The running gear is heavy, strong and easily operated. The tuyere irons are of ample thickness and size to resist the action of the fire. The fire-pan consists of a double plate with asbestos between, which prevents the heat from cracking the main pan or affecting the running gear. The Blower is made in the same manner as the regular Steel Pressure blowers, with babbitted journal boxes, steel shaft and galvanized steel blast wheel.

SPECIFICATIONS.

Code Word.	No. of Forge.	Height of Pan in Inches.	Size of Pan in Inches.	Diam. of Blower in Inches.	Regular Hand-Power.		For Blast From Independent Blower.		Belted Blower.	
					Weight.	Price.	Weight.	Price.	Weight.	Price.
Garantirla..	1	34½"	21 diameter	10	117	$20.00			145	$20.00
Garantisco	2	34½"	21 "	10	127	20.00			155	20.00
Garantisme	3	34½"	21 "	10	140	20.00			168	20 00
Garantissi..	4	32½"	22 x 33	10	157	20.00	133	$15.00	185	20.00
Garantito	5	32½"	26 x 38	10	173	25 00	149	18.00	201	25.00

Forges Nos. 1, 2 and 3 of the regular pattern differ only in the style of the hoods.

* Code words refer to hand blowers.



POWER FORGES.

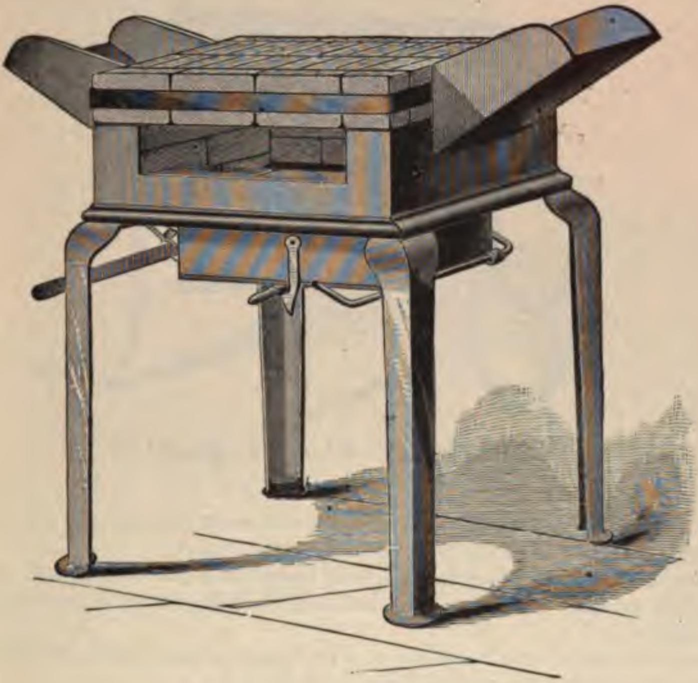
This forge is for general work in shops where power is used, and on a great variety work will save the labor of a helper. It has 14-in fan, giving capacity for the heaviest kin work, and is built complete, with tight and loose pulley; also, cut-off for the blast, by which fire can be regulated to any degree.

POWER FORGE No. O.

Code Word.		Price
Garapino	Power Forge No. 0—With Water Tank	$58.00
Gararoba	Power Forge No. 0—Without Water Tank	54.00
Garasa	Power Forge No. 0—With Water Tank and Hand-Power Attachments	62.00
Garatos	Power Forge No. 0—With Hand-Power and without Water Tank	58.00

Forge No. 0—Fan, 14 in.; size, 28x50 in.; weight, 250 lbs.

As noted, we can also furnish hand-power attachment, for use at times when steam-pow is not available, making it a very complete machine.



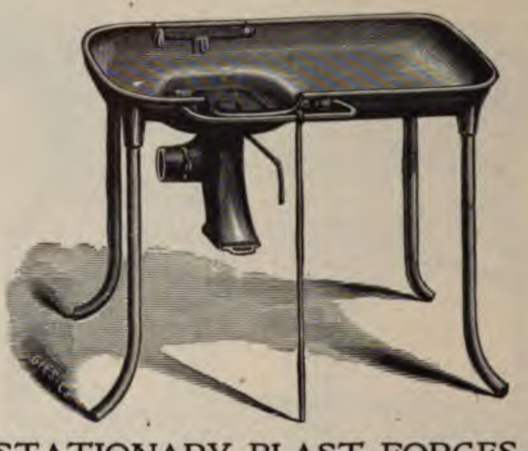
HEATING FORGE NO. 32.

We can furnish any of these Forges arranged to suit the various kinds of work. Nos. 32, 33, 34, 35, 36 and 37, are made with openings on one or both sides and coal chute on one or both ends. Also with openings on one or both ends, and coal chute on one or both sides. No. 32 and 33 with opening on both ends make a very desirable double forge for short, light work. Forge No. 35 is especially designed for heating axes, hatchets, hammers and similar goods; has long, narrow fire-place; and is very economical of fuel.

We can furnish special sizes and styles at short notice and moderate cost.

TABLE OF SIZES.

Code Word.	No.		Size.	Price.
Ganzopfer.....	30	Complete without Brick Grate Surface	8 x10″	$....... .....
Ganzpacht....	31	" " " " "	12 x12″	$... ....
Ganztaegig ..	32	" " " " "	13½x22″	$............
Ganzton	33	" " " " "	12 x20″	$............
Ganzuas	34	" " " " "	12 x44″	$............
Ganzwelt......	35	" " " " "	8 x22″	$...... ......
Gaouri........	36	" " " " "	18 x40″	$............
Garach	37	" " " " "	18 x40″	$...... ......
Garachide ...	38	" " " " "	24 x24″	$...... ......



STATIONARY BLAST FORGES.

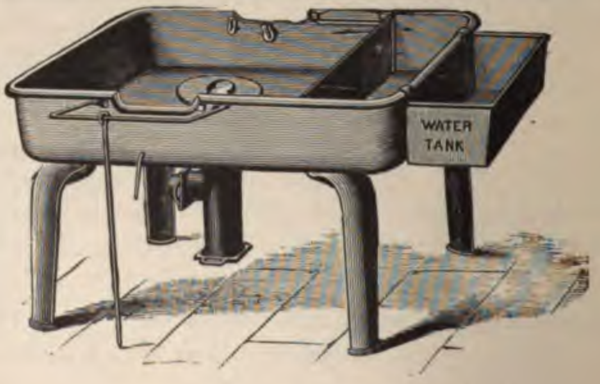
These Forges, although light in appearance, are very strong; are cheaper and much handsomer than the brick forge, and can be easily moved when desired.

No. 00s Forge has large, deep fire-pan, with heavy tuyere, and is especially intended for heavy work; is complete in every respect, combining coal box, water tank, and blast gate with lever in tuyere.

We do not furnish a "hood" with any of these Forges, unless especially ordered extra. The usual practice is to hang a "canopy hood" over them.

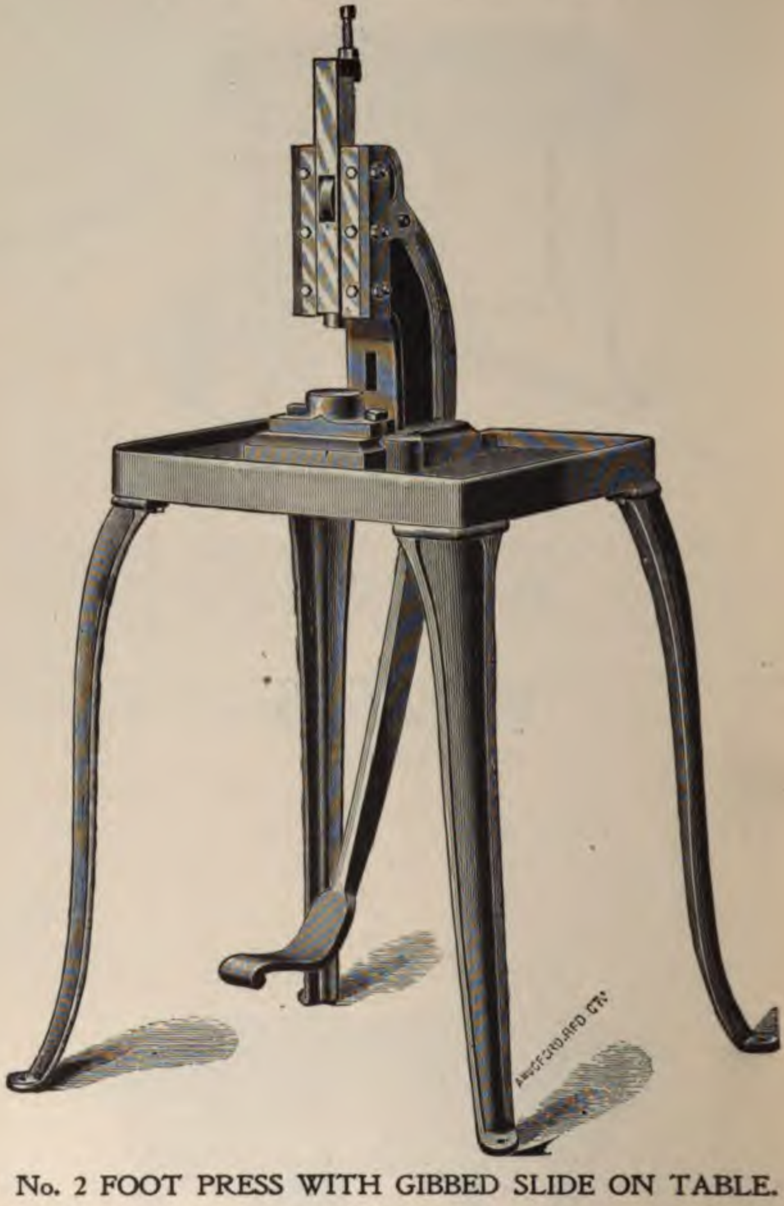
SPECIFICATIONS.

Code Word.	No.	Height of Pan, Inches.	Size of Pan, Inches.	Price.
Garaguay...........	0s	26	28x40	$ ....
Garalhada	1s	27	21x27	$...........................
Garamas	02	26	26x36	$ ....
Garambaz..........	00s	26	38x51	$...........................
Garamone..........	03	26	61x48	$...........................



PART XXV.

PRESSES.

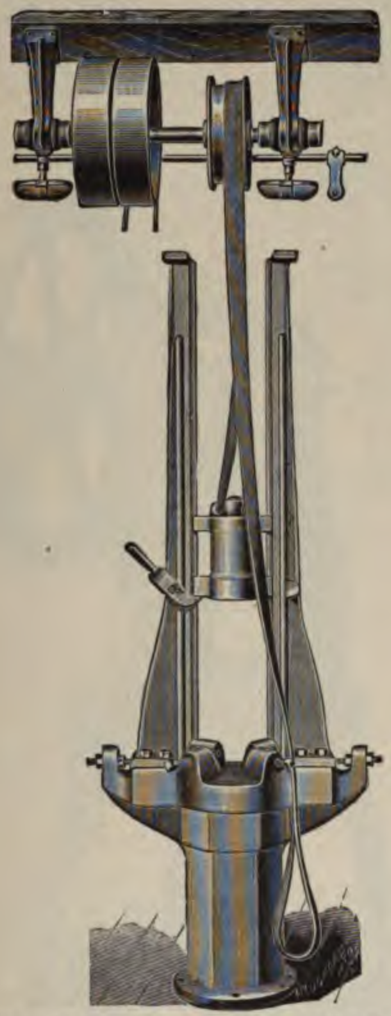


No. 2 FOOT PRESS WITH GIBBED SLIDE ON TABLE.

SPECIFICATIONS.

Code Word.	No.	Stroke.	Distance from Bed to Guides.	Distance Bed to Slide when Down.	Distance Center of Slide to Upright.	Distance Between Die-Bed Bolts.	Opening in Bed.	Weight	Price.
Frazione....	2	1¾″	6″	2¾″	3″	5½ or 7½″	2″	300 lbs	$........

The table is 24 x 30 inches, and 36 inches high.



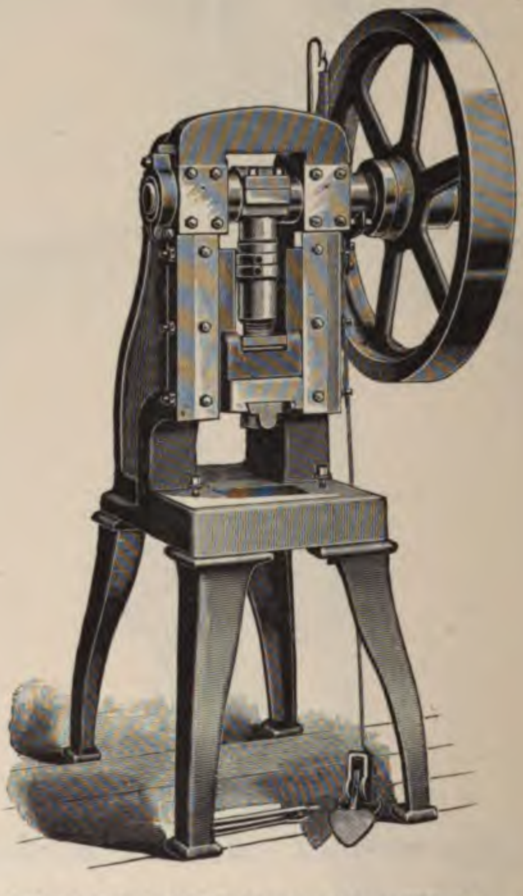
FOUR-POPPET DROP PRESSES.

Made with heavy cast-iron poppets and steel screws.

SPECIFICATIONS.

Code Word.	No.	Weight of Hammer	Total Weight	Diam. of Bottom of Base.	Height from floor to Top of Base.	Length of Uprights	Distance between Uprights.	Distance between Poppets.	Price with Counter-shaft.
Garauna	1	80 lbs.	1000lbs	14″	27″	60″	7¾″	6¾″	$ ....
Garavato	1½	120 lbs.	1600lbs	16″	29″	68″	9″	8″	$ ....

These presses are popular for all kinds of light stamping. Price includes dove-tail in hammer.



OPEN BACK, SINGLE-ACTING PRESSES (Heavy).

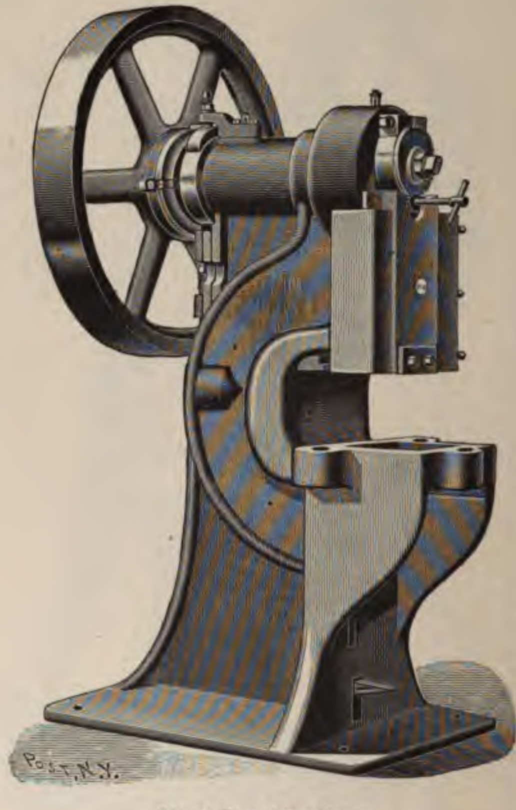
OPEN BACK, SINGLE-ACTING PRESSES (Heavy).

The illustration represents the No. 4 size of a new line of Single-Acting Presses; geared presses are all made with a cut cast-iron gear and steel pinion.

DIMENSIONS OF HEAVY SINGLE-ACTING OPEN-BACK PRESSES.

PLAIN AND GEARED.

Number of Press.	2	3	3½	4	5	6	7	8
Height from bed to center of shaft...... ins.,	16	18⅝	21	24	27¼	31	31¾	35½
Height from bed to slide when down	4½	5½	5½	6	7	7	8¼	8¾
Maximum stroke........	2	2	3	3	3	3	3	3
Distance from center of slide to uprights.........	3¼	3¾	3¾	4	4¼	4½	5½	5½
Distance from center of slide to front of bed..	6	6¾	6¾	7¼	8⅛	9	10½	10½
Width of bed.	12	14⅝	14⅞	17¼	19	22¼	29	34
Width between uprights..	4¾	8	8⅛	8¼	9⅛	11½	14	19
Distance between die bed bolts......	7	7½	7½	8	9	13	15	16
Diameter of hole through bed	3	4	4	4	5	6	8	8
Diameter and face of fly wheel, plain..	18x3	20x3½	20x3½	30x4¼	36x4½	42x5½	48x6	5 x7
Weight of fly wheel, plain......lbs.,	100	150	150	320	400	620	850	1,400
Diameter and face of fly wheel, geared ......ins ,				24x4	30x4	38x5	38x5½	38x6½
Weight of fly wheel, geared...... ......lbs.,				225	300	500	530	600
Geared				4 to 1	4 to 1	4 to 1	4 to 1	4 to 1
Total weight, plain......lbs.,	575	820	950	1,550	2,150	3,250	5,000	7,200
Price.								
Total weight, geared......				1,750	2,500	4,200	6,200	9,000
Price								
Code word, plain machines......	Frenzy..	Frequent	Freres....	Fresadas.	Frescando	Frescava..	Frescoed..	Frescoso..
Code word, geared machines......				Fresnal ..	Fresorum	Fresquel..	Fressgier.	Fresslust.



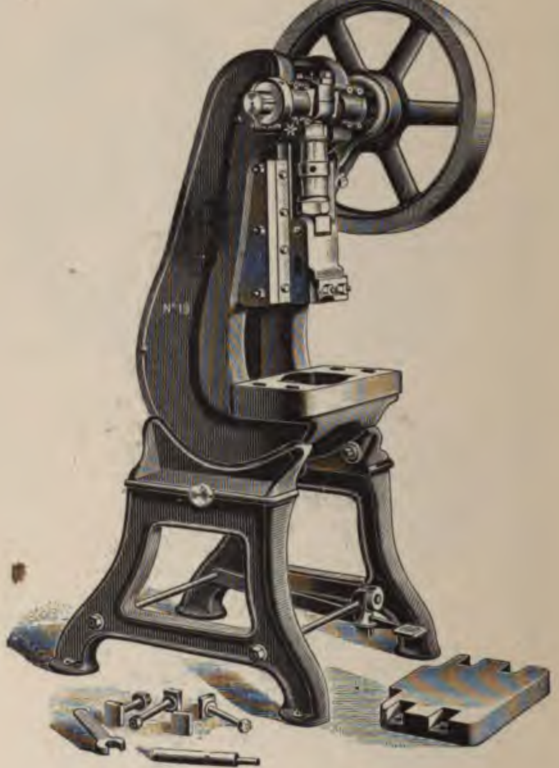
No. 3 Punching Press.

AN IMPROVED SOLID FRAME PUNCHING PRESS.

AN IMPROVED SOLID FRAME PUNCHING PRESS.

FLY WHEEL AND GEARED PRESSES.

No. of Press.	0	1	2	3	4	5
Diameter and Face of Fly Wheel..........ins.	18x2½	24x3½	30x4½	38x5½	42x6½	50x7½
Diameter and Face of Balance Wheel, Geared ....ins.		18x2½	24x3½	30x4½	38x5½	42x6½
Strokes per minute, Fly Wheel..................	150	140	130	120	110	100
Stroke of Slide, (standard),..................ins.	1	1	1¼	1½	1½	1½
Adjustment of Slide,..................... ...... ins.	1	1	1	1	1	1
Size of opening in Bed,............. .... ins.	3x5	4x6	5x8	7x10	9x12	11x14l
Distance back from center of Slide,...... ins.	4	4½	6	7½	9	10½
Distance from bed to end of Slide when stroke and adjustment are up, ... ins.	6	6	7	8	9	10
Shaft Diameter,.................. ....ins.	2⅜	2⅞	3½	4⅝	5½	6
Proportion of Gearing,.....		1:4	1:5	1:6	1:6	1:7
Revolutions back shaft, per minute.........		240	250	240	240	280
Strokes per minute, Geared,...		60	50	40	40	40
Pulleys, Diameter and Face.........					22x5¼	24x6½
Weight of Fly Wheel,........................... lbs.	115	225	350	775	900	1400
Weight of Balance Wheel, Geared,...... ..lbs.		115	225	350	775	900
Weight complete, Fly Wheel, about lbs.	550	950	1650	3200	5 00	7500
Weight complete, Geared, about......... lbs.		1275	2050	3700	6500	9000
Price, Fly Wheel Presses,..........	$	$	$	$	$	$ ....
Price, Geared Presses,...	$	$	$	$	$	$ ....
Code Word, Fly Wheel Presses, ...	Fregaban......	Fregacao......	Fregado...	Fregamos......	Fregandola...	Fregarono.....
Code Word, Geared Presses, ...		Freiarche......	Freibank	Freibaum......	Freibrief.......	Freiduras......



No. 19 Upright Position.

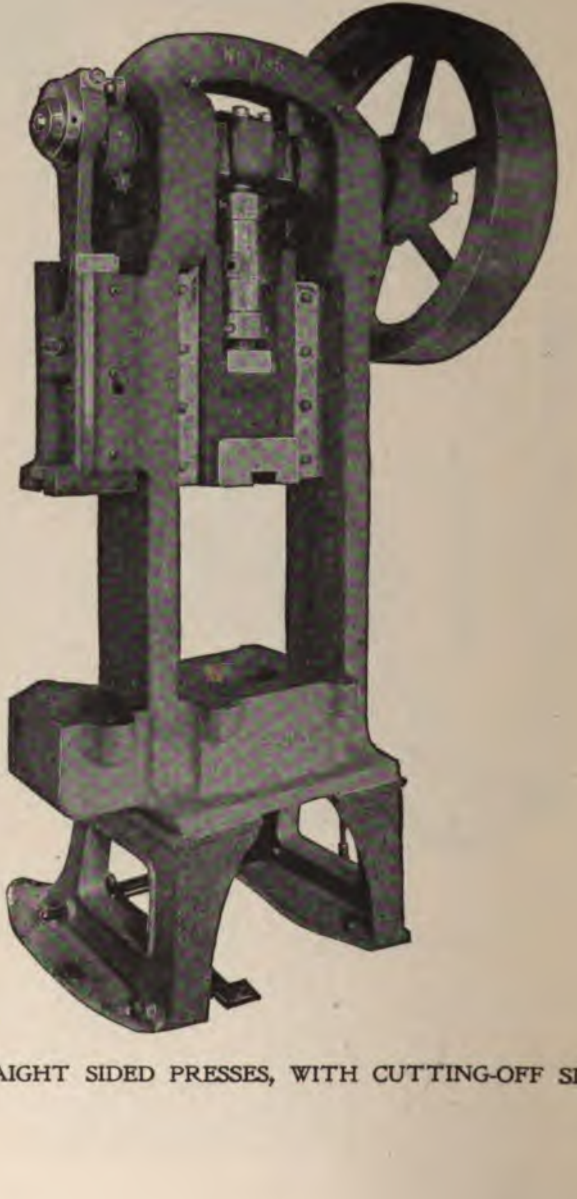
ADJUSTABLE INCLINE PRESSES.

ADJUSTABLE INCLINE PRESSES.

SPECIFICATIONS.

No. of Press.	10	15	16	19	20	21
Opening through Bed, diameter .... ins.	3x5	4x6	6	7	10	14
Distance from center back .... ins.	4	4½	4½	5¼	6½	9½
Open through Back.... ....ins.	5¼	6¼	7¼	8¼	9½	13½
Distance from Bed to end of Slide when up .... ins.	6	7	7½	7½	8½	10½
Standard Stroke of Slide. .... ins.	1	1½	1½	2	2	2½
Adjustment of Slide.. .... ins.	1½	1½	2	2½	3	3½
Diameter of Balance Wheel......... .... ins	16	18	22	27	34	38
Face of Balance Wheel .... ins	2½	2¾	3¼	4	5	5½
Speed per minute.........	150	150	150	125	100	100
Thickness of Bolster Plate................	1¼	1¼	1½	2	2½	2¼
Weight of Balance Wheel ....lbs.	80	115	175	275	550	775
Weight complete................................ lbs.	350	700	850	1400	2500	3500
Price, including Bolster Plate, Wrenches, &c	$	$	$	$	$	$ ....
Price extra Bolster	$	$	$	$	$	$ ....
Code word........	Freimarke.....	Freimos..	Freimuth......	Freindre	Freinte.........	Freiport.......

Similar presses, actuated by double action cams, can also be supplied.



STRAIGHT SIDED PRESSES, WITH CUTTING-OFF SLIDE.

STRAIGHT SIDED PRESSES.

WITH OUTSIDE CUTTING-OFF SLIDE.

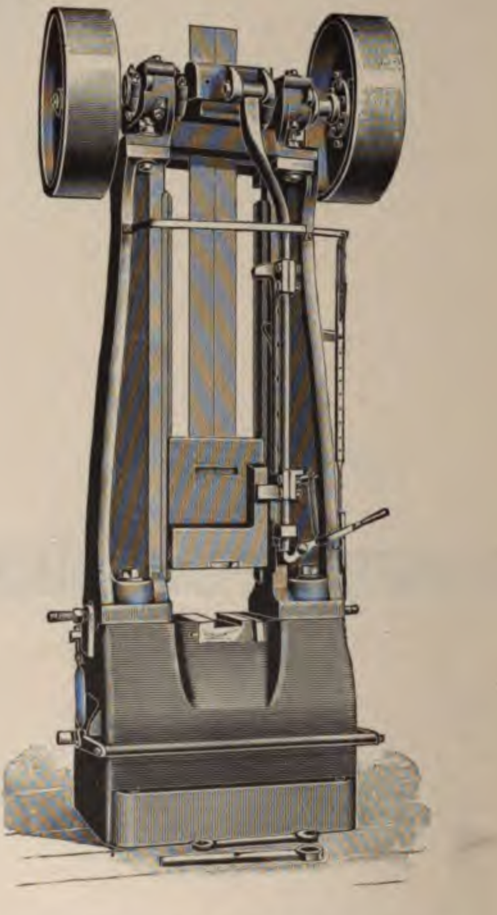
SPECIFICATIONS.

No. of Press.	725	735	745	755	765
Diameter of Fly Wheel ins.	38	42	50	60	65
Face of Fly Wheel ins.	5¼	6½	7½	7½	9
Standard Stroke, Main Slide ins.	3	3	4	5	6
Standard Stroke, Cutting-Off Slide ins.	2	2	3	3	4
Adjustment, Main Slide ins.	3	3	4	5	5
Adjustment, Cutting-Off Slide ins.	1	1	1	1	1
Distance from bed to end of either Slide ins.	12	15	15	16	16
Distance between columns ins.	15	19	23	25	27
Distance from center of Cutting-Off Slide to frame ins	3½	4½	5½	6½	7½
Standard Opening through main frame bed ins.	6	8	10	12	14
Standard Opening through outside bed ins.	3x5	4x7	5x8	6x9	7x10
Top of main frame bed ins.	12x14	16x17	18x20	20x23	24x26
Strokes per minute	110	100	90	80	70
Weight of Fly Wheel lbs.	775	1000	1400	1800	2200
Weight complete lbs.	3800	5500	8200	11000	16000
Price, including Cutting-Off Slide	$	$	$	$	$
Code Word	Fremito	Fremoris	Fremoso	Fremuisti	Frenandas

These presses can also be furnished without the Cutting-Off Slide and in either case can be furnished geared if desired.

PART XXVI.

POWER HAMMERS.



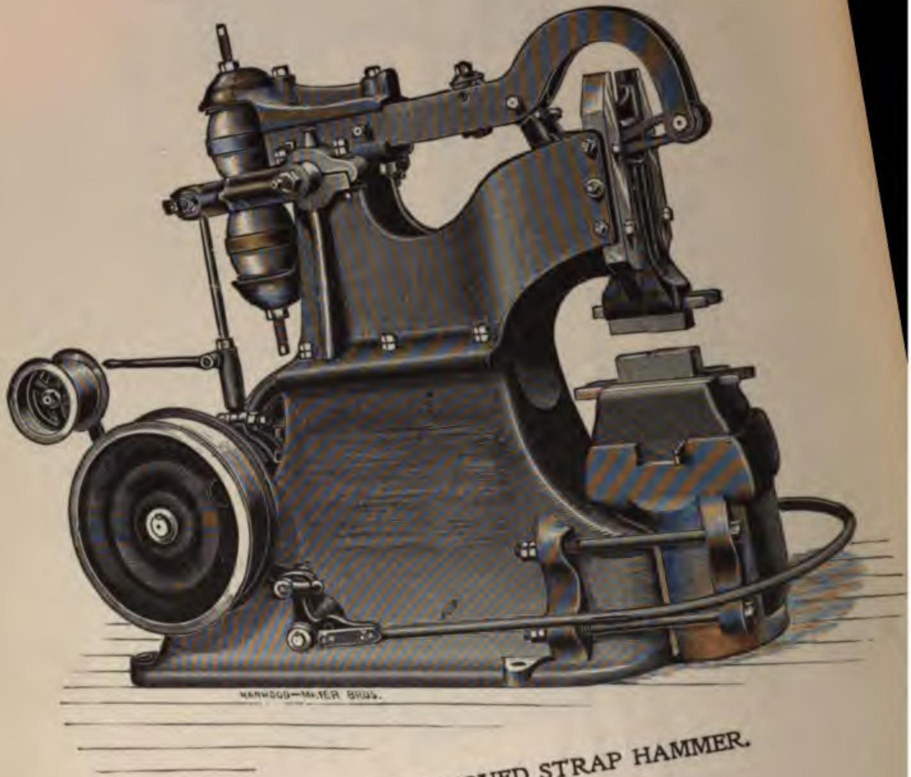
POWER DROP HAMMERS FOR FORGING

POWER DROP HAMMERS FOR FORGINGS

The hammer illustrated opposite embodies several recent improvements, a few of which are as follows:—the dogs are clamped to the lifter rod in a manner which does away with their slipping; the value of this change will be easily seen; the bearings for the front roll shaft in the lifter yoke are babbitted, thus doing away with the defects of the old system of brass bushings. Other sizes of machines, both larger and smaller than given in the following list, can be furnished.

SPECIFICATIONS.

Code Word.	Weight of Hammer Pounds.	Weight of Base Pounds.	Size of Bottom of Base Inches.	Height from floor to top of Pulleys.	Length of Uprights.	Distance between Uprights at Base.	Diam. and Face of Pulleys Inches.	Rev. per Minute.	Total Weight Pounds.	Price.
Garbaccio.....	150- 200	2,800	21½x29	8 10/12′	5′	12″	20x 4½	160	4,800	$ ....
Garbancera...	300- 400	5,400	24 x34	9½′	5′	14″	20x 6	136	8,500	$............... ....
Garbanzal.....	450- 550	6,750	24 x36	10½′	5½′	15″	24x 6	125	10,500	$................ ....
Garbanzos....	600- 750	9,000	30 x41	11′	6′	16½″	30x 8½	110	15,000	$ ....
Garbatino.....	800-1000	12,600	32 x47	12 10/12′	7⅓′	19″	35x 8½	100	20,000	$........ ....
Garbatone.....	1050-1300	16,000	34 x50	13′	7⅔′	21″	36x10½	90	24,000	$ ....
Garbeaba....	1350-1650	19,000	4[illegible] x54	13½′	7⅔′	21″	36x10½	80	30,000	$.........................


HARWOOD—MAYER BROS.

UPRIGHT CUSHIONED STRAP HAMMER.

UPRIGHT CUSHIONED STRAP HAMMER.

This hammer is of the upright style in which the head or ram is operated vertically in ways or guides, and the dies are always parallel.

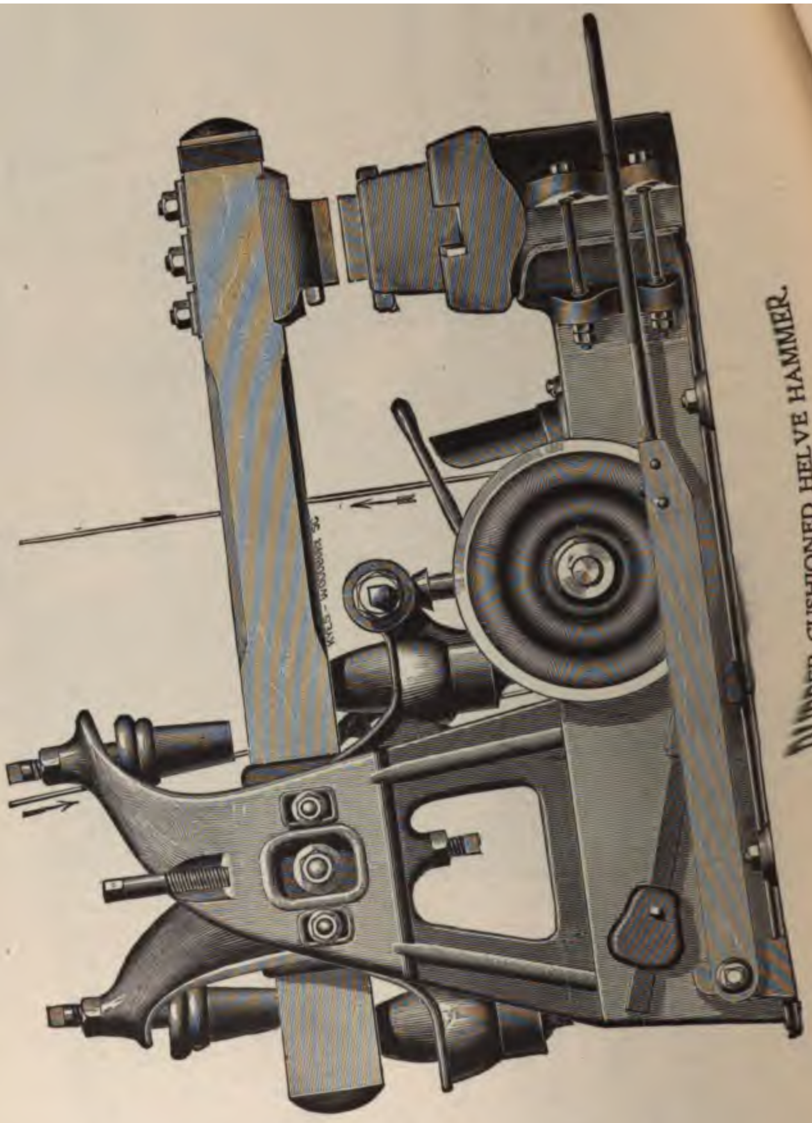
The head or ram is held and operated by a leather strap suspended from spool-shape bearings between the two parts of the steel helve.

Rubber cushions at rear of helve absorb all shock or jar, give spring and life to the thrusts of the pitman, and add materially to the force of the blows.

SPECIFICATIONS.

Code Word.	Size of Hammer.	Diameter of Driving Pulley.	Width of Belt.	Average No. of Blows per Minute.	Average Size of Iron for which suited. *	Floor Space over all, about	Weight about	Price.
Garbosos......	15 lbs	8″	3″	400	⅝ to ¾″	21x36″	800 lbs	$......................
Garboteau	30 lbs	12″	3″	350 to 375	1″	28x45″	2,400 lbs	$...... ....
Garbuglio	50 lbs	14″	4″	300 to 315	1½″	32x54″	3,100 lbs	$ ....
Garbullos......	75 lbs	14″	4″	300 to 315	1½″	32x54″	3,200 lbs	$.............. ....
Garcaille.......	100 lbs	18″	6″	275 to 300	1¾″	39x60″	4,600 lbs	$ ... .
Garcinia	125 lbs	18″	6″	275 to 300	2″	39x60″	4,800 lbs	$ ....
Garcon	150 lbs	22″	6″	250 to 275	2½″	41x78″	5,700 lbs	$ ....
Gardasses	200 lbs	22″	6″	200 to 225	3″	41x78″	6,800 lbs	$........................
Gardenly	300 lbs	26″	8″	150 to 175	3½ to 4″	52x96″	10,300 lbs	$ ....
Gardiaan......	500 lbs	34″	8″	150 to 175	4 to 5″	52x96″	13,200 lbs	$ ....

*These are but approximate estimates, as any Hammer will do both larger and smaller work in emergencies Estimates are for sizes for which each Hammer is especially suitable for continuous service.



RUBBER CUSHIONED HELVE HAMMER.

RUBBER CUSHIONED HELVE HAMMERS.

The anvil block is a casting separate and distinct from the main frame.

Everything except the cushions and helve is of iron or steel.

The cushions are of the best rubber procurable, and their duty is to absorb the concussion of the blow and add force to it.

The wood helve is hung upon hardened steel centers, and may be adjusted so that dies varying in thickness may be used.

The eccentric hub and strap are made of steel, accurately finished and the eccentric upon which it works is covered with the best anti-friction metal.

The shaft which carries it is of steel, liberal in size, and with bearings at each end.

The power is applied by means of a foot-treadle extending around the bed of the hammer, so that the operator may stand in front or on either side.

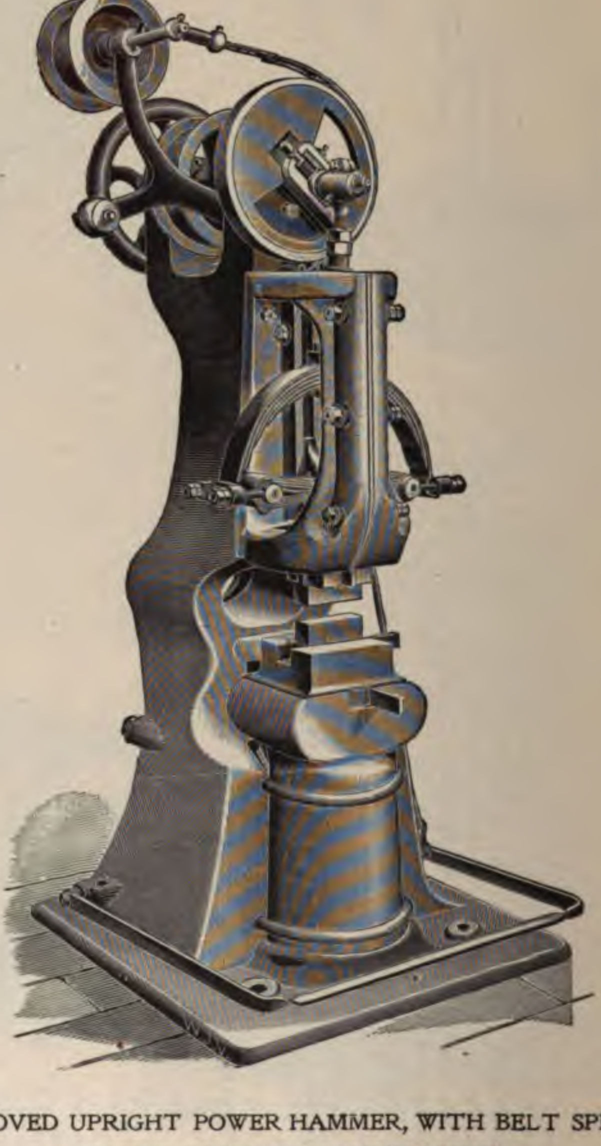
A gentle pressure of the foot brings the loose pulley up to the belt and the rapidity and force of blow is regulated by this pressure.

On removing the foot a brake acts at once on balance wheel, bringing it to a stop instantly.

It always stops with the helve up, never with the dies closed.

SPECIFICATIONS.

Code Word.	Size of Hammer.	Diameter of Driving Pulley.	Width of Belt.	Estimated Horse Power Required.	Average No. of Blows per Minute.	Aver. Size of Iron for Which Suited.	Floor Space.	Price.
Garela..........	15 lbs	10"	2½"	¼ to ¾	435	¼"	54"x28"	$....................
Garenbleek.........	25 lbs	12"	3"	¾ to 1	400	1"	68"x29"	$....................
Garendoos.........	40 lbs	14"	4"	1½ to 2	300 to 315	1¼"	82"x34"	$....................
Garenklos..........	60 lbs	18"	6"	2 to 2½	290 to 300	1¾"	91"x43"	$....................
Garenmolen.......	80 lbs	18"	6"	2¼ to 3	275	2"	96"x48"	$....................
Garenprop.........	100 lbs	18"	6"	2½ to 3	275	2½"	96"x48"	$....................
Garenrol..........	200 lbs	26"	8"	3 to 3½	225 to 240	3½" to 4"	106"x54"	$....................



IMPROVED UPRIGHT POWER HAMMER, WITH BELT SPRING CONNECTION AND ADJUSTMENT.

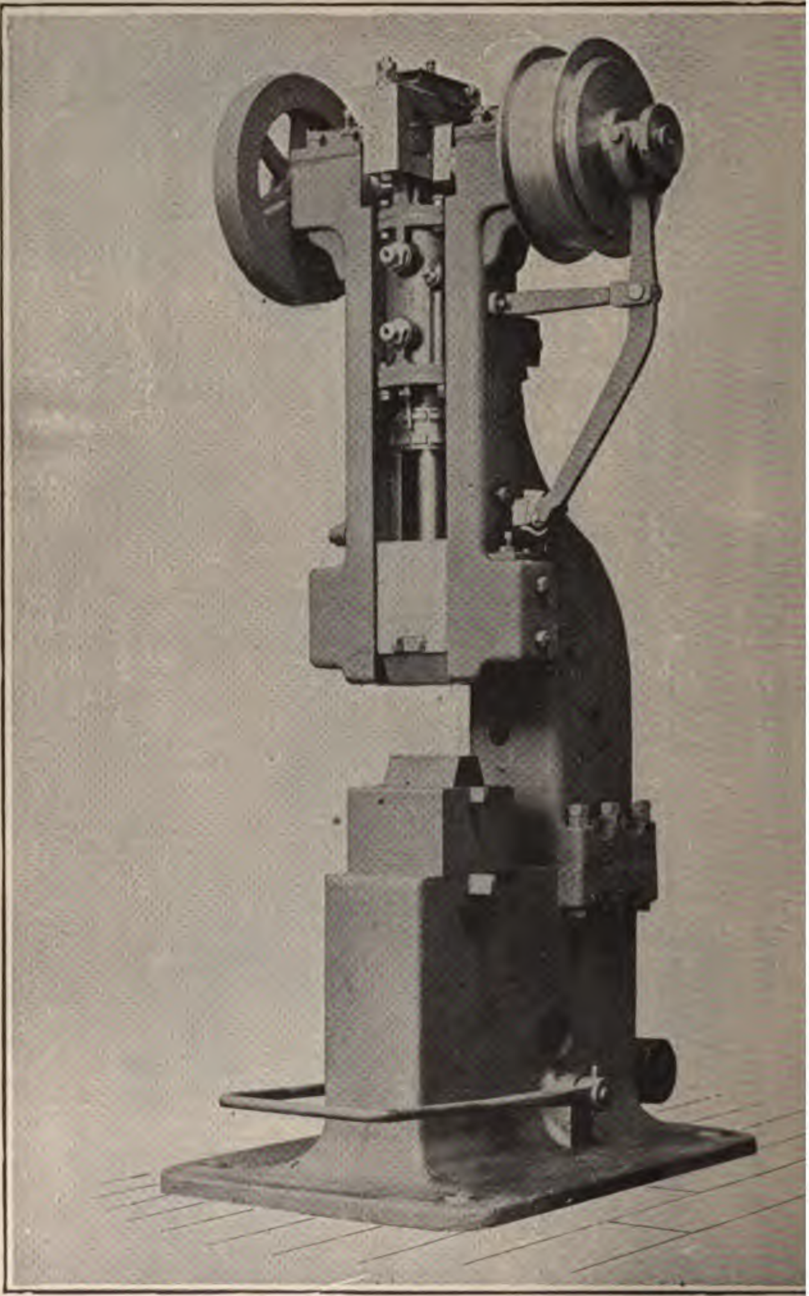
IMPOVED UPRIGHT POWER HAMMERS.

Construction simple; occupies less space; requires least power; stock of greater extremes in size can be worked. A superior hammer for all work requiring a rapid, strong and elastic stroke. The dies are adjustable, always run true and never rest together when idle.

The anvil is placed directly on the foundation, and separate from the frame. The hammer can be started and stopped instantly and perfectly controlled by one man.

SPEICFICATIONS.

Code Word.	Weight of Ram.	Size of Base.	Diam of Drive Pulley.	Size of Belt.	Average No. of Blows per Minute.	Adapted to Work Stock.	Height from Foundation to Center of Shaft.	Extreme Size of Die.	Weight Complete.
Garfearian....	25 lbs	26x26″	10″	3″	400	¼ to 1″	5′ 8″	5 x 6″	1500 lbs
Garfearon......	30 lbs	26x26″	10″	3″	400	½ to 1¼″	5′ 8″	5 x 6″	1550 lbs
Garfilha	40 lbs	36x35″	10″	3½″	400	½ to 1½″	5′ 9″	5 x 7″	2500 lbs
Garfios	50 lbs	36x35″	10″	4″	400	½ to 1¾″	5′ 9½″	5 x 7″	2600 lbs
Garfish	60 lbs	37x37″	11″	4½″	350	¾ to 2″	6′ 0″	5½ x 8″	2900 lbs
Garfuana	80 lbs	37x37″	11″	5″	350	¾ to 2½″	6′ 2″	5½ x 8″	3100 lbs
Gargaglia......	90 lbs	39x39″	14″	5½″	300	1 to 3″	6′ 5″	6½ x 9″	3700 lbs
Gargale...	100 lbs	39x39″	14″	6″	300	1 to 3½″	6′ 6″	6½ x 9″	3900 lbs
Gargalho	125 lbs	47x48″	18″	6½″	275	1½ to 4½″	7′ 0″	7½ x 10″	5000 lbs
Gargalize......	150 lbs	47x48″	18″	6¾″	250	2 to 5″	7′ 2″	7½ x 10″	5400 lbs
Gargalone.....	200 lbs	47x48″	20″	6¾″	200	2 to 5½″	7′ 2″	7½ x 10″	5600 lbs



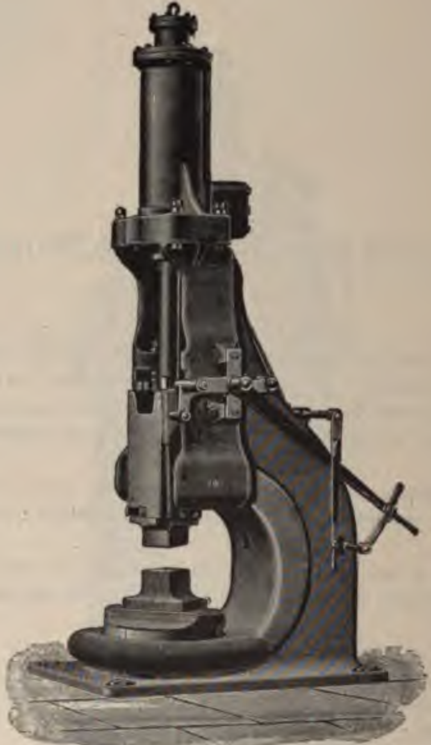
SINGLE STANDARD PNEUMATIC POWER HAMNER.

SINGLE STANDARD PNEUMATIC POWER HAMMERS.

The operating crank shaft of this hammer has at one end a driving pulley with friction surfaces, and on the other end a counter-balanced fly-wheel. The crank works in a yoke having a sliding box of phosphor bronze, and the yoke is attached directly to an air cylinder, supplied with automatic inlet valves in front and outlet valves in the back, the ports of which are controlled by a wedge operated by a treadle at the base of the frame. The treadle operates simultaneously the brake block, friction clutch and outlet valves. As the treadle is pressed down by the foot of the operator, a vertical reciprocating motion is at once given to the cylinder and head, the speed and force of the blow depending on the extent to which the treadle is pressed down. The cylinder and head stop instantly on withdrawing the pressure from the treadle.

SPECIFICATIONS.

Code Word.	Size.	No. of Blows per Minute.	Distance between Dies when at Rest.	Travel of Head.	Length of Dies.	Size of Driving Pulley.	Spead of Driving Pulley.	Total Height Over all.	Size of Bed Plate.	Shipping Weight.	Price.
Gargaridis.....	50 lbs	350	4''	7''	5½''	14x4''	350	6' 8''	3'4''x2' 0''	2500 lbs	$ ... .
Gargarisme..	75 lbs	300	4½''	8''	6''	14x4''	300	7' 0''	3'7''x2' 3''	3500 lbs	$..........
Gargarizar....	100 lbs	275	5''	10''	6½''	16x4½''	275	7' 3''	3'8''x2' 6''	4000 lbs	$ . ...
Gargarizo......	150 lbs	240	6''	12''	7''	16x4½''	240	7' 10''	4'2''x2'10''	5000 lbs	$..........



600-POUND HAMMER.

STEAM HAMMERS.

We call attention to this very complete list of Steam Hammers for all duties, covering, we believe, a wider range than that of any other make in the United States, including Single Stand Machines from 150 to 2500 pounds, Double Stand Hammers from 1100 pounds to 60 tons, falling weight; also Steam Drop Hammers, Helve Hammers, and Locomotive Frame Hammers, in numerous sizes, in standard designs or made to meet the special wants of manufacturers.

PATENT SINGLE STAND STEAM HAMMERS.

These hammers have a patent slide valve, which is perfectly balanced, very easily handled, and has the greatest durability.

The valve gear is always positive in its action, simple, easily got at, and not liable to get out of order; requires only boy to handle; automatic continuous blows, or a blow of any intensity, can be had at will.

A patent cylinder cushion head prevents injury to cylinder through carelessness or otherwise.

This hammer has the automatic and drop hammer qualities combined, requiring the blacksmith only to put it in operation. One or any number of blows can be given at will; when the lever is released the Hammer will rise and stay up ready for the next blow.

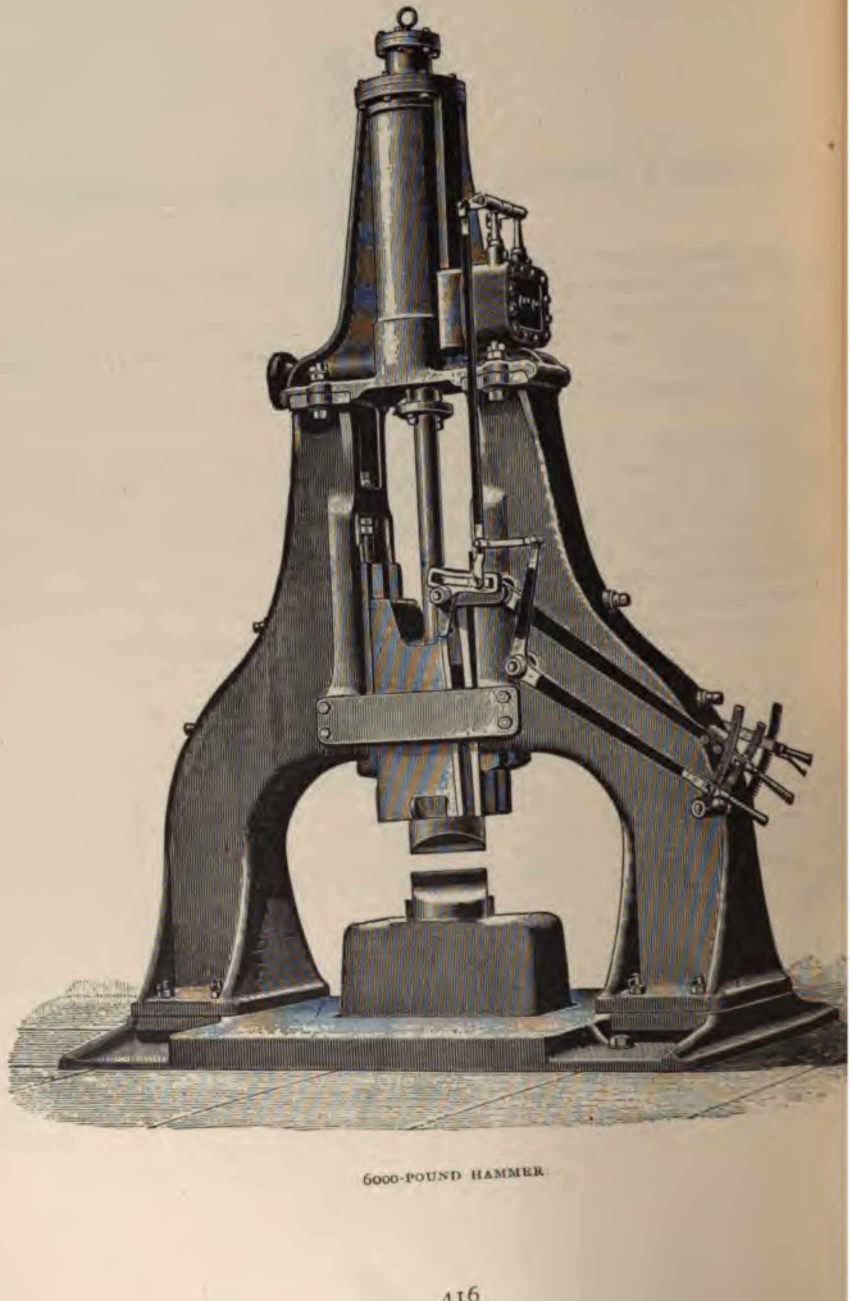
Piston can be raised above top of cylinder, to admit of placing in new rings without disconnecting rod from ram.

Adjustable ram guides of "V" form readily take up all wear. They have a solid backing on the main frame.

Complete foundation drawings and specifications furnished with each Hammer.

SPECIFICATIONS.

Code Word.	Falling Weight.	Length of Stroke.	Diam. of Cylinder.	Price.
Gargote..........................	150 lbs	12″	4½″	$........................
Gargouille......................	250 lbs	14″	5″	$........................
Gargousse..	400 lbs	16″	6″	$..... ....
Gargoyles........	600 lbs	20″	7″	$ ....
Gargozza	800 lbs	24″	8″	$. ... .
Garguero,........................	1100 lbs	26″	9″	$........................
Garheit	1250 lbs	28″	10″	$...... ....
Garherd........	1500 lbs	30″	12″	$........................
Gariandro........................	2000 lbs	33″	13″	$...... ....
Garidelle........	2500 lbs	36″	14″	$...... ....



6000-POUND HAMMER.

PATENT DOUBLE STAND STEAM HAMMERS.

The cut represents a line of Double Stand Hammers up to 10 tons. Larger machines are usually made of special form to suit the duty for which they are intended.

The valve gear is positive and simple, easily gotten at and not liable to get out of order. It requires only a boy to operate it. Automatic continuous blows can be struck, or single blows of any desired intensity, at will of the operator.

A patent cylinder cushion head prevents entirely any damage to cylinder.

The adjustable ram guides are of "V" form, and take up all wear. They have a solid backing on the main frame of the machine.

Foundation plans and specifications furnished with each Hammer.

SPECIFICATIONS.

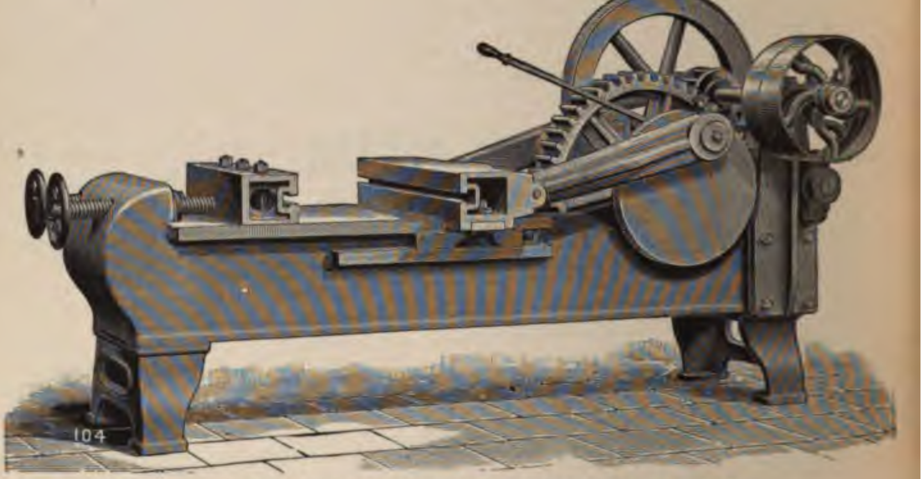
Code Word.	Falling Weight.	Length of Stroke.	Diam. of Cylinder.	Price.
Gariofilo......................	1100 lbs	21″	10″	$........................
Garishly	1500 lbs	26″	11″	$........................
Garishness....................	2000 lbs	30″	13″	$........................
Garissoles....................	2500 lbs	30″	14″	$........................
Gariteros.	3000 lbs	33″	14″	$........................
Garites...........................	4000 lbs	42″	18″	$........................
Gariwald	5000 lbs	48″	18″	$........................
Garizim........................	6000 lbs	48″	20″	$........................
Garknecht..	8000 lbs	54″	22″	$........................

PART XXVII.

BULLDOZERS.

PART XXVII.

BULLDOZERS.



HORIZONTAL BENDING OR FORMING MACHINE.

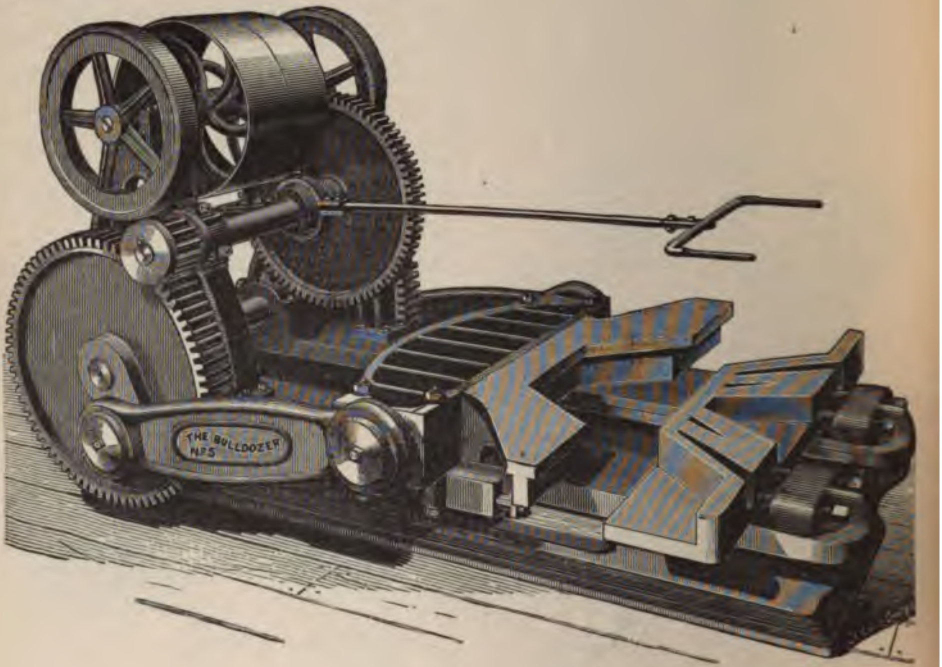
HORIZONTAL BENDING OR FORMING MACHINES.

The machine illustrated on opposite page is one of another series of "Bulldozers." The principle dimensions of this series can be found in the following table, while the characteristics of their design are shown by the illustration. One jaw is stationary or adjustable by screws while the other is driven by two cranks through powerful gearing on tight and loose pulleys.

The lever that stands up over the large gear operates a clutch by means of which the machine can be started or stopped instantly.

SPECIFICATIONS.

Code Word.	No. and Style.	Style.	Stroke.	Length of Jaws.	Strokes Per Minute.	T & L Pulleys.			Weight.	Price.
						Diam.	Face.	Rev.		
Garouille	7	Single Geared	6"		16"	12"	3½"	112	3500 lbs	$ ....
Garoupa..	6	" "	9"		16"	14"	3¾"	112	4500 lbs	$.................
Garous..........	5	" "	12"	18x 4"	14"	14"	4¼"	100	6000 lbs	$........ ....
Garpa............	4	Double "	15"	40x 6½"	11"	18"	5¼"	150	8000 lbs	$.................
Garpfanne.....	3	" "	18"	50x 7¾"	11"	20"	5¼"	150	10500 lbs	$.................
Garprobe	2	" "	20"	55x 8½"	10"	24"	5½"	140	13500 lbs	$.................
Garracicao....	1	" "	22"	60x10½"	10"	28"	5½"	140	17000 lbs	$ ....
Garrafales.....	A	" "	24"	60x10½"	9"	30"	6¼"	130	21000 lbs	$.................
Garrafinha....	B	" "	24"	60x10½"	9"	32"	6½"	130	25000 lbs	$ ....
Garrafones....	C	" "	24"	6 x10½"	8"	34"	7¼"	120	29500 lbs	$.................
Garrana........	D	" "	24"	60x10½"	8"	36"	7½"	120	35000 lbs	$........ ....



THE BULLDOZER.

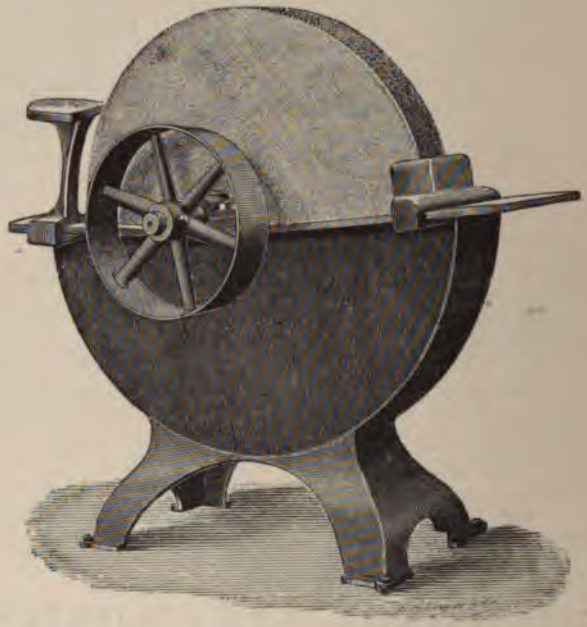
THE BULLDOZER.

The Bulldozer Press is now so well known as scarcely to need explanation. Perhaps the most striking advantage of the machine is that while better adapted, of course, to some classes of work than others, yet it is probably better entitled than any other, to be called a Universal Forging and Shaping Machine, because adapted to such a variety of work. It adapts itself more universally to the numberless changing and increasing needs of the forge shop than any other machine.

SPECIFICATIONS.

Code Word.	No.	Length over all.	Width over all.	Face of Cross-head.	Movement of Cross-head.	Space for Dies.	Countershaft.			Weight.	Price without Dies.
							Diam. Pulleys	Face.	Rev.		
Garrientis.....	1	6'7''	3'5''	29½ x 5''	14''	14''	18''	4¾''	*36	3800 lbs	$... .....
Garrierunt....	2	7'4½''	3'7''	34½ x 6¾''	16''	17½''	20''	6⅛''	42	5900 lbs	$........
Garrigue.......	3	8'8''	4'	39 x 7''	16''	25''	24''	6½''	51	7800 lbs	$........
Garrirai	4	10'8''	4'7''	45½ x 7½''	18''	38''	24''	8¼''	45	12000 lbs	$........
Garriremus..	5	11'8''	6'3''	63 x11¼''	20''	38''	24''	9¼''	46	18000 lbs	$. ......
Garrirono	6	12'	6'3''	63 x11¾''	20''	38''	3 ''	10½''	33	23000 lbs	$........
Garrisco........	7	16'		68 x16''	24''	45''	ENGINE DRIVEN			45000 lbs	$........

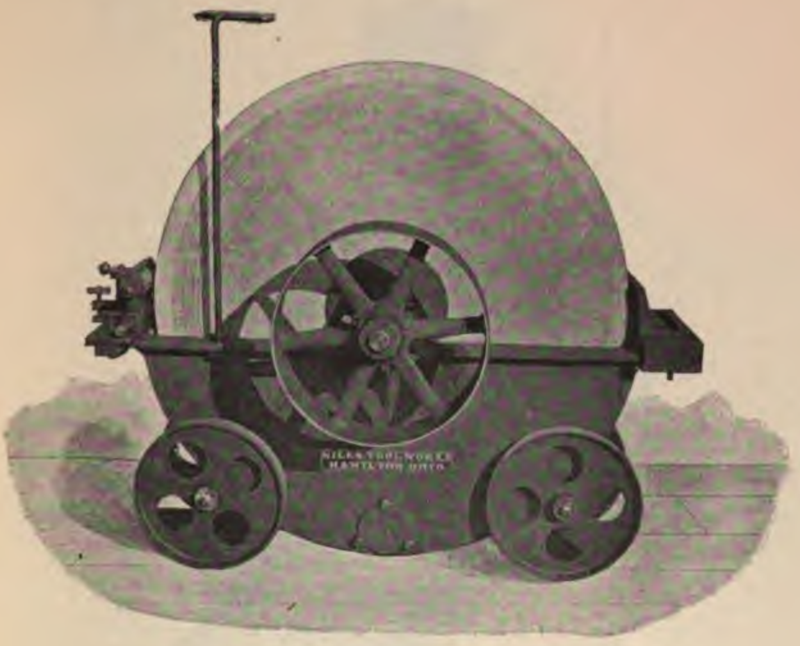
*Rev. of pulley to one movement crosshead.



AN IMPROVED IRON GRINDSTONE FRAME.

These frames are neat, strong and durable. The frames are cast all in one piece, provided with shield grinding rest and extra heavy arbor running in babbeted boxes with driving pulley of ample dimensions. It also has hole tapped in bottom for draining purposes. The very best stones are furnished; they should run for ordinary work from 600 to 1000 feet per minute. We keep in stock, for quick delivery, the following sizes:

CODE WORD.	SIZE OF STONE	PRICE WITH STONE COMPLETE.	PRICE WITHOUT STONE
Gebellt.	24x3½ or 4	$20.00	$18.00
Gebet.	26x3½ or 4	23.00	20.00
Gebeugt.	30x3½ or 4	28.00	24.00
Gebieten.	36x4 or 5	44.00	38.00
Gebiger.	40x4 or 5	48.00	39.00



GRINDSTONE BOX.

Improved Pattern.

TO TAKE A STONE 4 FEET DIAMETER AND 8 INCHES FACE.

Designed to meet the requirements of modern machine-shop practice.

The trough is a single casting, mounted on four wheels; stone is hung on a square wrought iron arbor, secured sideways by large nuts and flanges; bearings are large, self-oiling; will run without attention for weeks.

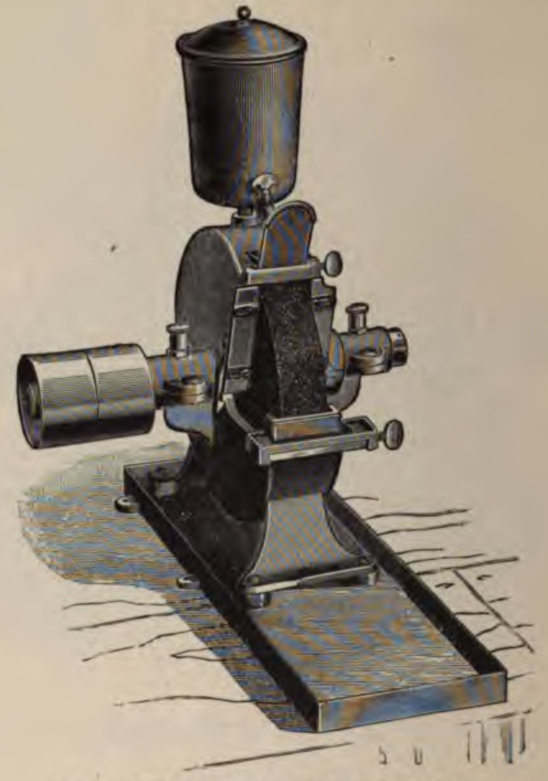
The grinding rest permits the water running over it to return to the trough.

When the stone becomes smaller, and a change of pulleys is necessary to keep up the speed, the belt need not be cut but the box moved to accommodate the change.

The box may be wheeled to the door, hand-hole plates taken off and trough slushed for the removal of all sediment, permitting a shop being kept neat and tidy and preventing sand and water trickling from one floor to another.

SPECIFICATIONS.

Code Word.	For	Weight.	Price.
Nominate.. ..	Grindstone Box, with Dresser	....	$..........
Nomineh	Grindstone Box, with Stone and Dresser........................	....	$............



BENCH TOOL GRINDER.

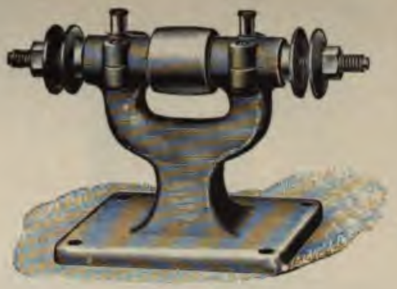
This Bench Tool Grinder is designed to sharpen machinists' tools of all kinds, running a corundum wheel in water, the grade of wheel varying to suit the kind of work to be done The particles of corundum composing the wheel are hard and sharp, and will cut many times faster than the ordinary grindstone. It takes up less room; it is cleaner; it makes no offensive smell, and is the cheapest general tool grinder ever produced. This machine can be set up anywhere, taking up bench room of only 22x12 inches, thus allowing several to be located on a floor in large shops, having them conveniently situated for the men, so as to avoid walking distances to sharpen a tool. The saving of time in this way alone will soon pay for the small cost of the grinder. A special corundum wheel has been adopted for use in this grinder, which by reason of its porous nature is constantly moist, and in consequence all danger of drawing the temper from tools is avoided.

Set the grinder on bench or stand, slightly pitched to the front, the near edge of pan projecting over the bench. The water runs to the front (where a hole is drilled), and into a bucket or pail, which can be swung from a hook provided underneath the pan. A waste pipe can be attached to run the water off, if desired.

Speed of wheel, 700 to 900 revolutions per minute.

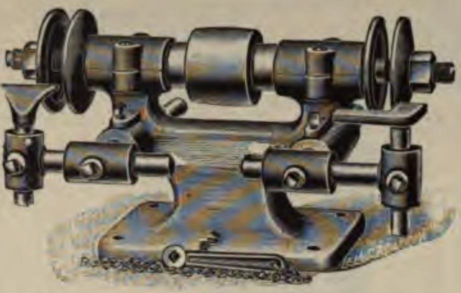
Code Word.		Price.
Gefrage	With 10x1 inch Wheel, Single or Double Pulleys	$25.00
Gefrieren	With 10x2 inch Wheel, Single or Double Pulleys.	$30.00
Gefrit	Countershaft	$12.00 extra
Gefroren	Adjustable Angle Rest	$ 2.50
Gefuege	Adjustable Angle Rest, with Traverse Table	$15.00

GRINDER HEADS.



8-inch.

This machine takes wheels to 8 inches diameter, 1-inch face, and ½-inch hole.



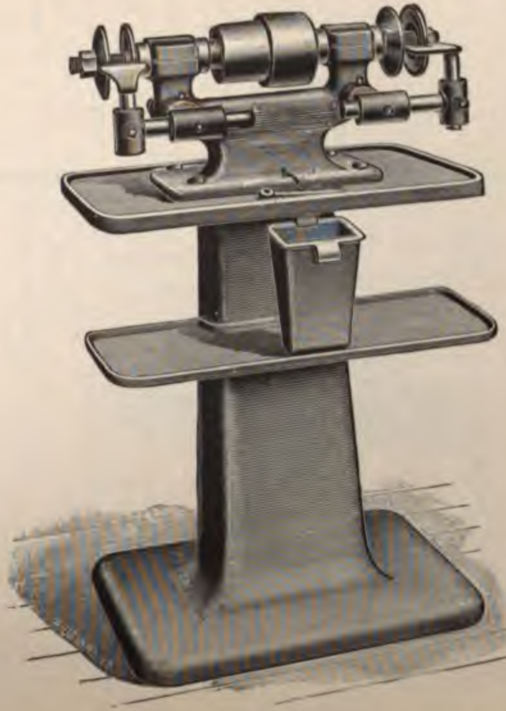
10-inch.

This machine takes wheels to 10 inches diameter, 1½-inch face, and ¾-inch hole.

Are particalarly well adapted for light grinding and polishing; can be easily attached to bench or other support. Furnished with column when desired.

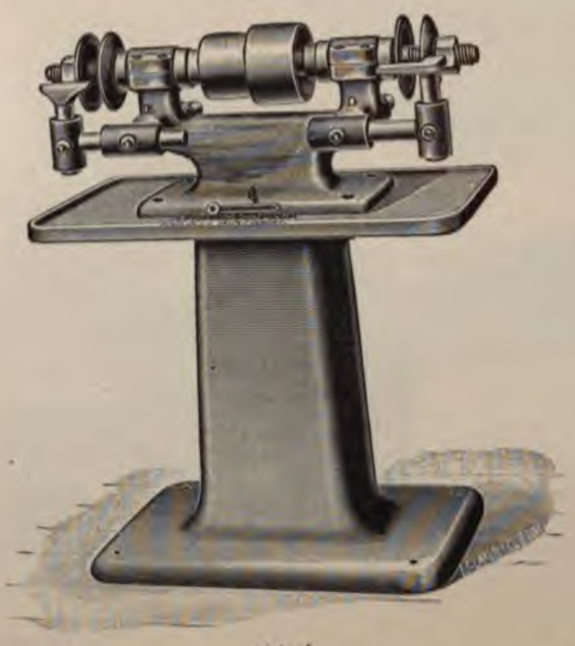
For Specifications see Page 431.

GRINDER HEADS ON COLUMNS.



14-inch.

This machine takes wheels to 14 inches diameter, 2½-inch face, and 1¼-inch hole.



16-inch.

This machine takes wheels to 16 inches diameter, 3-inch face, and 1½-inch hole.

For Specifications see Page 431.

SPECIFICATIONS OF EMERY GRINDER HEADS.

Emery Wheel.			Pulley.		Distance Between Wheels.	Height to Spindle.	Weight Ready for Shipment.
Diam.	Face.	Hole.	Diam.	Face.			
8"	1"	½"	2"	1¾"	7"	5¼"	10 lbs
10"	1½"	¾"	2¾"	2¼"	11"	6½"	35 lbs
12"	2"	1"	3½"	2¾"	15"	7¾"	65 lbs
14"	2½"	1¼"	4¼ & 5¼"	3¼"	19"	9"	105 lbs
16"	3"	1½"	5 & 6"	3¾"	23"	10¼"	165 lbs
18"	3½"	1¾"	5¾ & 6¾"	4¼"	27"	11½"	255 lbs

SPECIFICATIONS OF COLUMNS.

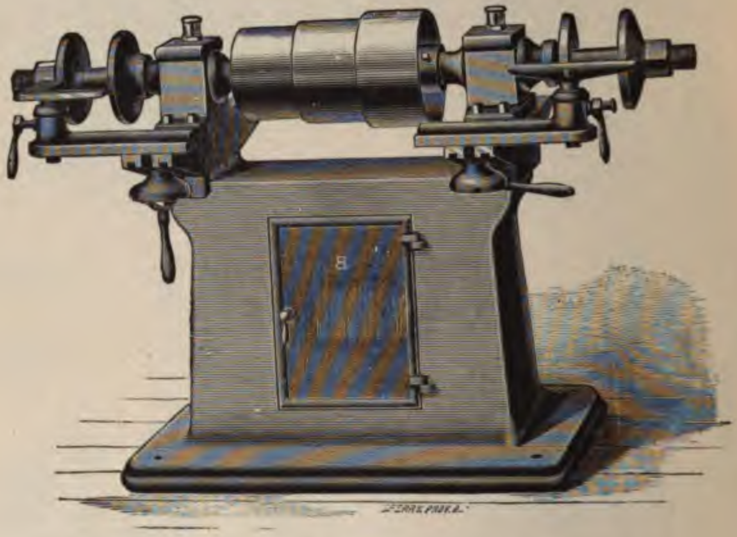
Height.	Base.	Table.	Weight Ready for Shipment.	Style.
36¾"	13x16"	12x15"	95 lbs	With Waterpot and Shelf.
34"	14x18"	14x18"	115 lbs	
31⅛"	16x21"	16x21"	155 lbs	
28½"	18x24"	18x26½"	205 lbs	
25¾"	20x27"	20x42"	255 lbs	Without W-P. & S.
23"	22x30"	22x37½"	315 lbs	

imensions of Countershafts see page 459.

PRICE LIST EMERY GRINDERS.

d.*	Size.	Complete with Column and Countershaft.	Complete with Column.	Column Only.	Grinder Head Only.	Countershaft Only.
.....	8"	$18.00	$11.50	$ 7.50	$ 4.00	$ 6.50
.....	10"	27.00	19.00	9.00	10.00	8.00
.....	12"	40.00	30.50	10.50	20.00	9.50
.....	14"	56.00	42.00	12.00	30.00	14.00
.....	16"	70.00	53.00	13.00	40.00	17.00
.....	18"	84.00	64.00	14.00	50.00	20.00

rshafts for these Machines are shown and Specifications given on pages 458 and 459.
ode words given are for the complete machine with column and countershaft.



GRINDING MACHINE No. 8.

GRINDING MACHINES.

These machines are of heavy construction, very strong and durable, yet of neat design. They have a steel spindle, engine lathe boxes, arms for rests, both front and back, each rest being provided with a patent wrench and patent levers for securing them firmly to the frame. The bearings have a patent dust excluding attachment, and nickel plated oil cups with patent oil feeders are used.

The construction of these machines throughout is equal to the best work done on an engine lathe. They have all the latest improvements, and are a valuable tool for use in any foundry or machine shop. A surface attachment is provided when desired.

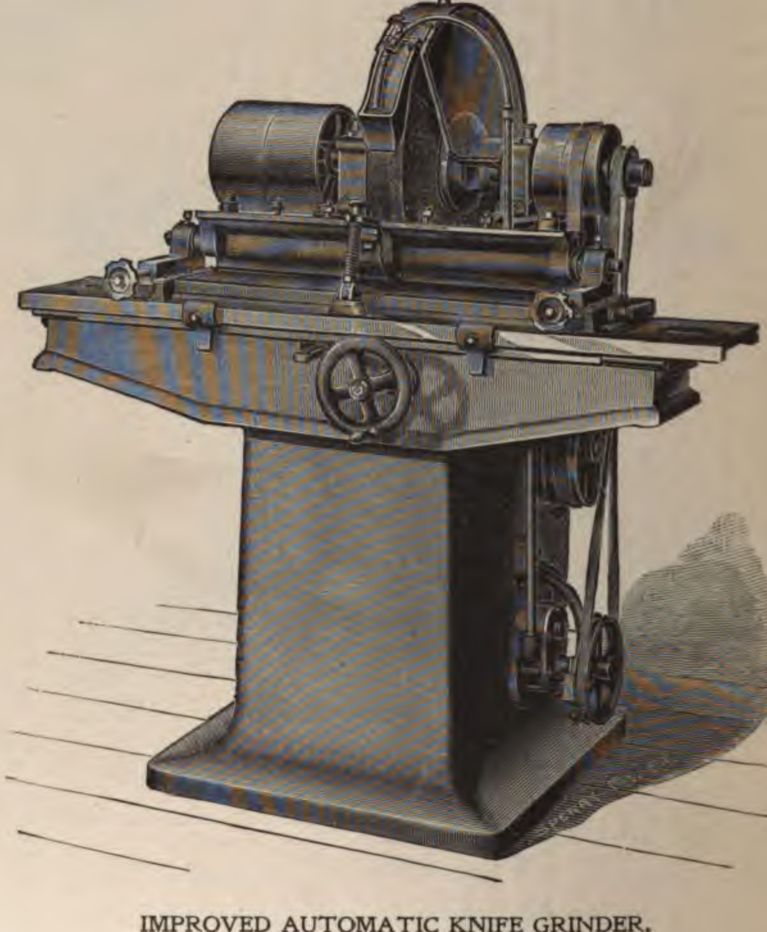
In general design and construction the illustration is representative of the class to which it belongs and which is briefly described by the following table, except that in the smaller sizes the column is separate from the machine which can be used with or without it, as desired:

SPECIFICATIONS.

Code Word.	No.	Diam. of Emery Wheels.	Distance Between Wheels.	Size of Pulley on Spindle.	Size of Base.	Countershaft.			Weight.		Price without Column.	Price with Column.	Price with Column & Counter-shaft.
						Diam. Pulley.	Face.	Revo-lutions	Machine.	Column.			
Gaudebas......	1	6″	7″	2 x1½″	5½″	6″	2¼″	500	10	100	$ 6.00	$16.00	$ 26.00
Gaudebit......	2	6″	7″	2 x1½″	5½″	6″	2¼″	500	16	100	8.50	18.50	28.50
Gaudelia........	3	9″	12″	3 x2¾″	11x6½″	6″	2¼″	525	36	125	16.00	28.00	40.00
Gaudery........	4	12″	15″	4 x3½″	12x8½″	6″	2¾″	533	61	173	28.00	45.00	60.00
Gaudful........	5	14″	16″	4½&3½″ x3¼″	13x10″	6″	2¾″	550	100	175	33.00 46.00	48.00	*65.00
Gaudha.........	6	18″	23″	5&6 x4½″	16½x10″	8″	4½″	600	275	225	70.00	62.50	†80.00
Gaudialis......	7	20″	26″	6&7 x 4¾″	18 x12″	8″	5¼″	400	750	275		88.00	108.00
Gaudieb........	8	34″	40″	8–16″& 18x5¼″	26 x38″	10″	5¼″	350	1200				*175.00

* { Surface attachment for No. 5–$ 5.00.
Surface attachment for No. 8 $75.00.
Code Words apply to machine with column and countershaft.

†Adjustable Table attachment for No. 6—$30.00.



IMPROVED AUTOMATIC KNIFE GRINDER.

IMPROVED AUTOMATIC KNIFE GRINDER.

This machine is designed to grind knives for planers, paper cutters, tobacco cutters, rag cutters, iron shears, and, in fact, knives of any sort. The column is large and very stiff, the bed does not spring when the machine is bolted to the floor as it would be liable to do if it were supported by legs.

The wheel is carried on a steel spindle running in extra long bearings fully protected from dust. It is mounted on a carriage which is fed to the work by hand or automatically. The water hood is so arranged that all water is distributed directly on the wheel in front of the knife. A raised surface inside the hood leads all waste water and spray directly back to the patented siphon tank. No water will pass outside the hood, and the table is so arranged that no water will remain upon it. The table has automatic power feed in both directions.

The angle iron on which the knife is clamped is very strong and is arranged so that the wheel will grind toward the edge or the angle iron may be reversed and the knife be ground toward the butt. The angle iron holding the knife is moved to the wheel by small hand screws at each end. By this device the edge of the knife may be brought perfectly parallel to the guides on which the platen travels, after which the emery wheel is brought to the knife by the hand wheel. The center of the angle bar is encircled by a split yoke, and by loosening a screw in the yoke the knife may be swung into any desired pitch to the wheel. The platen is very wide and travels on wide ways. The machine has single pulley or tight and loose pulleys. We furnish overhead waterpot and drip for price named.

Size of base on floor, 26 ins., x 32 ins. Height from floor to center spindle 38 ins.

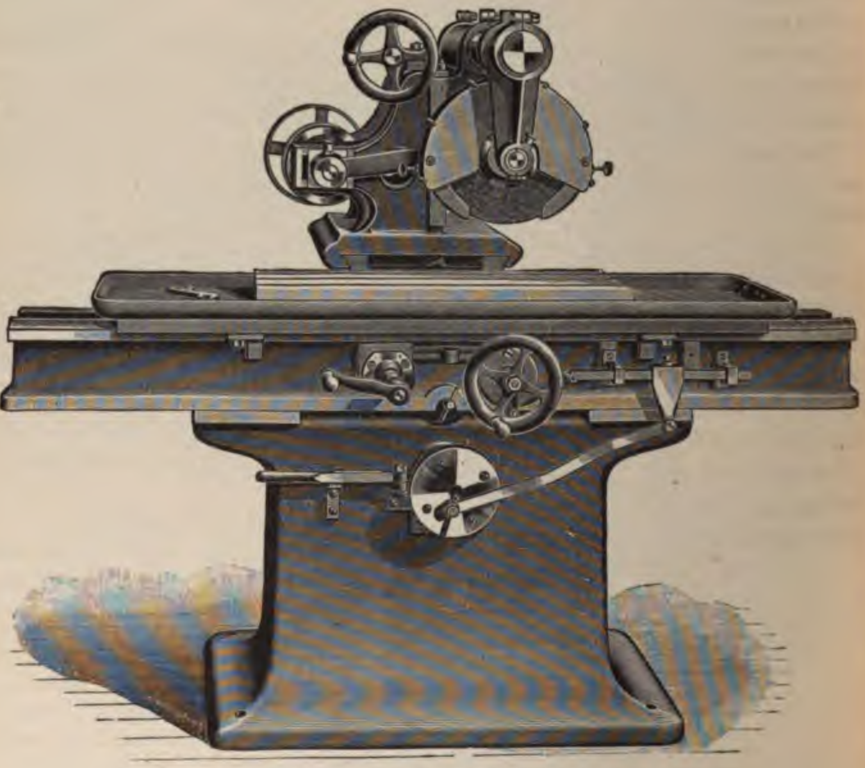
Countershaft has tight and loose pulley 10 x 4½ in. Driving pulley 14 in. x 4½ in., and should run about 200 revolutions per minute, giving the emery wheel a speed of 350 revolutions per minute.

SPECIFICATIONS.

Code Word.	For	Weight.	Price.
Gaudiosa......	26-in. Knife Grinder, with 24-in. wheel, T. & L. Pulley.....	1,200 lbs.	$187.50
Gaudivis.....	30-in. Knife Grinder, with 24-in. wheel, T. & L. Pulley ...	1,400 lbs.	200.00
Gaudriole.....	36-in. Knife Grinder, with 26-in. wheel, T. & L. Pulley	1,600 lbs.	250.00
Gaufou.........	Add $25.00 to list price for automatic cross feed of the wheel to the work		
Gaufre..........	Add $25.00 to list price for automatic pump and connections		
Gaufroir........	Price of countershaft for this machine, extra..........		18.00

Boxed weights are 20 per cent. greater.

For knives 50 inches and longer, write for circulars, etc.



AUTOMATIC SURFACE GRINDING MACHINE.

AUTOMATIC SURFACE GRINDING MACHINE.

This machine is intended for grinding flat metal surfaces, where great accuracy is required. The machine has a very heavy base, supporting both the table and the wheel directly from the floor, thus insuring great stiffness.

The bed which supports the table has mechanism to carry the work back and forth automatically under the wheel, or the automatic features may be dispensed with at will. Adjustable stops are provided to limit the stroke to any desired length, or the lever in front of the machine may be used to stop and start the table instantly at any point.

The machine will grind the surface of its own table, thus insuring the accuracy of all work done upon it. The emery wheel spindle is self oiling, and is provided with ample bearings in length and diameter.

The emery wheel is raised or lowered by a hand wheel and worm gear, and is capable of very fine adjustment. Graduations on the hand wheel indicate the amount of this movement. The emery wheel has self-regulating cross feed in both directions, with adjustments to secure as much or as little feed as desired. The feed is arranged to shift at one end or at both ends of the table; thereby economizing greatly in time. A guard is put on and around the table so that water may be used if desired. An automatic pump is furnished when ordered. Water and the pans connected with the same are inclosed inside of the column.

It is provided with a double countershaft carrying a drum for driving the emery wheel. Step cones give three speeds to the table. The dimensions of the machine shown are given below. Self-oiling boxes and dust protectors are used throughout.

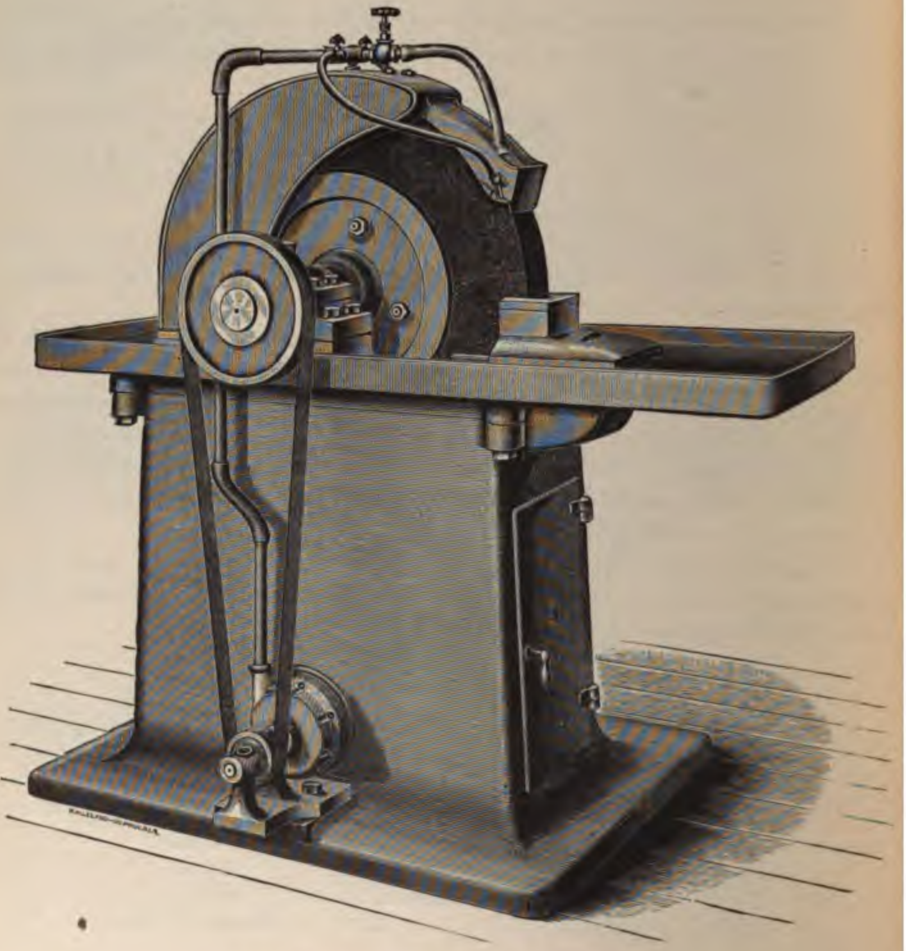
DIMENSIONS.

Diameter Emery Wheel	12 x 1¼ inches
Height of table from floor	34 “
Diameter of spindle in bearings, each	2½ “
Diameter of spindle between flanges	1½ “
Length of spindle bearings, each	6 “
Thickness of work to be ground	0 to 9 “
Floor space required	40 x 44 “
Tight and loose pulleys on countershaft	10 x 4½ “
Speed of countershaft	350 rev. per min.

Price complete with countershafts, emery wheel and wrenches:

Code Word.	FOR	Weight.	Price.
Gaukel	No. 1, to grind work 24x12x9 inches	3000 lbs.	$
Gaulette	No. 2, to grind work 36x12x9 inches	3500 lbs.	$
Gaulish	No. 3, to grind work 48x12x9 inches	4000 lbs.	$
Gaulode	No. 4, to grind work 60x12x9 inches	4500 lbs.	$

Add $25.00 to list price for automatic pump and connections.



SINGLE WHEEL TOOL GRINDERS.

SINGLE WHEEL TOOL GRINDERS.

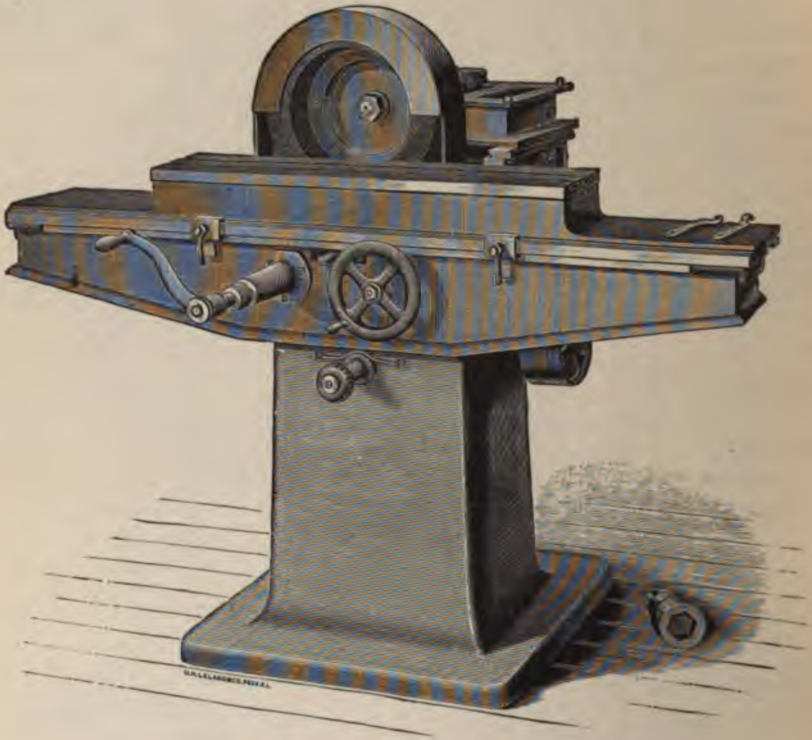
The machine has tanks located inside of column, easily accessible. An arrangement draws the water by siphon from the upper to the lower tank. Engine lathe boxes are used protected at each end by patented dust excluding device.

The water is distributed on the wheel directly in front of the tool being ground. On the inside of the hood a raised surface is cast, which is the outside diameter of the flanges used, and which leads all the spray or water from the inside of the hood to the column, keeping it entirely from the spindle and boxes. The rests are movable to and from the wheel, without the use of wrench. The collars, steel spindles, pulleys and all running parts are turned accurately to obtain a well-balanced, smooth-running machine.

The tool grinder with an automatic pump and separate water tanks, with the patented siphon arrangement for separating the clean water from the dirt and sediment, with the power to control or regulate the flow of water over the wheel and tool, when being ground by the operator, will always have an advantage over any machine of this class that uses the same water over and over, mixed with the sediment from the wheel, from which no provision has been made to separate the same, or to regulate the flow of it upon the wheel.

SPECIFICATIONS.

Code Word.	No	Size Emery Wheel.	Height to Center of Spindle.	Size of Spindle Bearings.	Diam. of Spindle Between Flanges.	Face and Diameter Pulley on Spindle.	Floor Space.	Countershaft.			Weight Complete.	Price Complete.
								Diam. T & L Pulleys	Face of Pulleys	Revs. Per Min.		
Gaumen........	1	14x2x1½"	38"	5x1¼"	1½"	5 x 3½"	21x17"	7"		350	400 lbs	$............
Gaunaca.......	2	18x2½x1¾"	38"	7x1½"	1¾"	5&6 x 3½"	24x17"	8"	3½"	250	1000 lbs	$...........
Gaunacis......	3	24x3½x10"	36"	8x1¾"	2"	10 x 5"	26x40"	10"	5¼"	270	1500 lbs	$............
Gauranus.	4	30x4x16"	37"	9x2¼"	3"	14 x 6"	28x45"	10"	6"	270	2000 lbs	$............
Gauros	5	30x4x21"	37"	10x2½"	3"	16 x 6"	28x51"	10"	6"	260	2500 lbs	$............



FACE GRINDING MACHINE, STYLE D.

FACE GRINDING MACHINES.

These machines are designed to do grinding where but a small amount of stock is to be removed and where a flat face is required.

The head has a cup wheel 14 inches in diameter carried on the end of a heavy steel spindle running in long bearings, securely protected from emery dust. The wheel is held either in an ordinary holder or in a patent adjustable holder. We recommend the latter because a thin wheel can be used which cuts faster and does not drag so much on the work as a thicker wheel. The head and wheel may be brought to the work by a hand wheel or the action may be made automatic and the feed regulated from one-thousandth up to one-sixteenth of an inch. This automatic movement is not supplied with the machine unless ordered, and then at extra price.

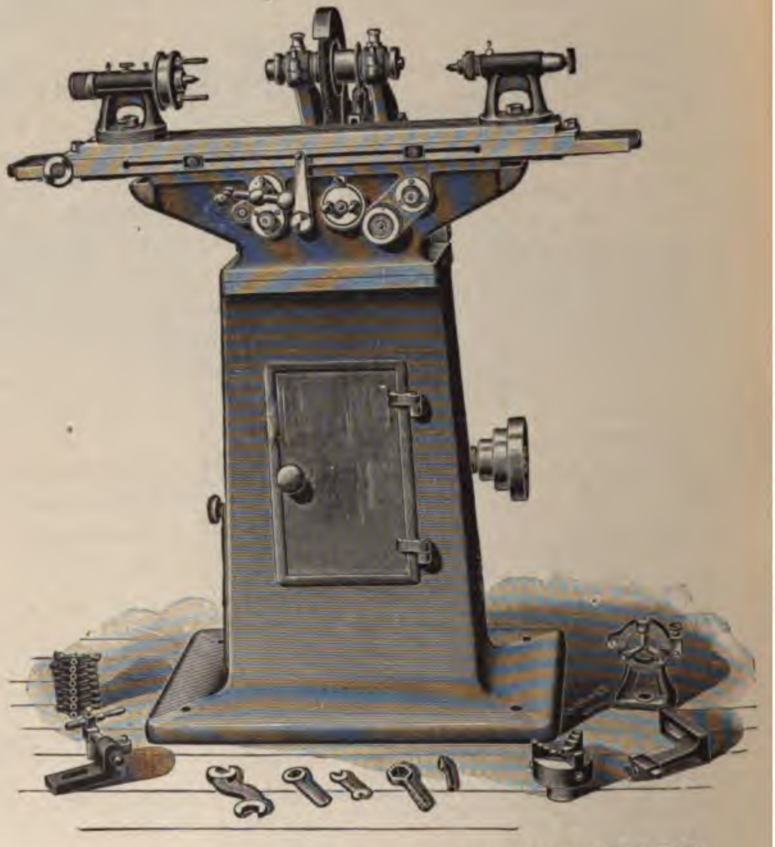
The platen is carried on accurately finished guides, protected from emery dust, and may be moved by hand or by automatic power feed, the length of movement being controlled by dogs engaging a shifting lever.

The countershaft has tight and loose pulleys 10 x 4½ inches, and should run 450 revolutions per minute, which gives the emery wheel a speed of 1000 revolutions per minute.

Size of base on floor	36 x 58	inches.
Height from floor to center spindle	38	"

SPECIFICATIONS.

Code Word.	For	Weight.	Price.
Gausser	No. 1, grinds 26 in., with wheel and countershaft	1400 lbs.	$267.50
Gauwdief	No. 2, grinds 30-in., with wheel and countershaft	1600 lbs.	287.50
Gauwerds	No. 3, grinds 36-in , with wheel and countershaft	1800 lbs.	325.00
Gauwort	No 4, grinds 50-in., with wheel and countershaft	2500 lbs.	400.00
Gauzy	No. 5, grinds 60-in., with wheel and countershaft	3000 lbs.	475.00
Gavarati	Add $25 to list price for automatic pump and connections.		
Gavardie	Add $25 to list price for adjustable cup wheel holder.		
Gavarro	Add $37.50 to list price for automatic feed of wheel to work.		



No. 1 UNIVERSAL GRINDING MACHINE, STYLE D.

This machine is specially adapted for grinding straight or taper, soft or hardened spindles, arbors, cutters, reamers, etc., and it can also be used for grinding rings, hardened boxes, etc., by means of a special chuck which can be furnished.

The wheel spindle, head stock and foot stock spindles are all of steel, carefully ground and run in bronze boxes adjustable for wear, and protected from emery dust.

The wheel stand slide swivels and has a graduated base. The end of spindle is drilled to take taper mandrel for carrying small wheel for facing work. The head is removed when the internal grinding fixture is used. The wheel stand may be moved to the work transversely by hand wheel graduated to thousandths of an inch on diameter of the work. It has an adjustable stop so that wheel may be run back and brought up to same place as before.

The sliding table carries a swivel table turning upon a center pin. The swivel table is provided with tangent screws in order to set it accurately, and has scales graduated to read 4½ degrees each side of the center line, and to 2 inches taper per foot for No. 1 machine; 4 degrees, 1½ inches taper per foot for machines Nos. 2 and 3. This arrangement allows tapers to be ground without throwing the head and foot stock out of line.

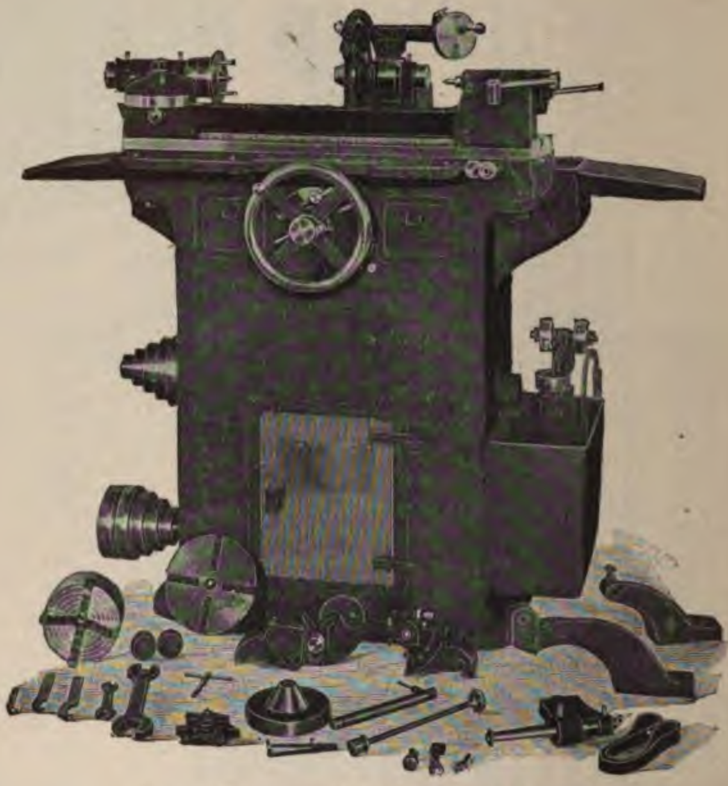
The sliding table may be fed in either direction by hand or automatically. The amount of travel being controlled by dogs which engage a lever on the front of the machine. The slides are carefully scraped to straight surfaces and are completely protected from emery dust.

The head stock is clamped to swivel table. It swivels and has a graduated base and may be set at right angles for grinding work on face plate or chuck, or at any degree for grinding centers. The front end is threaded and fitted with a No. 1 Morse taper hole. If work is to be ground on dead centers, the spindle may be locked and the work revolved by means of pulley on front end of the spindle. There is a special device for taking up the wear.

The foot stock is clamped to swivel table. The spindle is adjusted by a screw, and a spring is provided to adjust the spindle, if the work expands. The spindle has a No. 1 Morse taper hole. An automatic pump and connections to use water upon the work is provided when ordered.

SPECIFICATIONS.

Code Word.	No.	Swing.	Length Between Centers.	Traverse.	Emery Wheel.		Countershaft.			Size Base.	Weight Complete.	Price.
					Diam.	Hole.	Diam. Pulleys.	Face.	Rev.			
Gave'ock	1	8''	16''	20''	8''	3''	6''	3''	450	26x24''	1000 lbs.	$350.00
Gaverick.......	2	10''	22''	24''	8''	3''	8''	3''	350	24x36''	2000 lbs.	475.00
Gavial..........	3	12''	32''	35''	12''	5''	8''	4½''	200	32x48''	3000 lbs.	600.00



No. 1 UNIVERSAL GRINDING MACHINE.

UNIVERSAL GRINDING MACHINES, STYLE "L".

This machine is of special advantage where accuracy and uniformity are required. It is suitable for straight and taper grinding and is used in the manufacture of spindles, and boxes either hard or soft, cutters, arbors, reamers, and jewelers' rolls. The sliding table carries a swivel table which turns upon a center pin; this arrangement provides for grinding tapers without throwing the head and foot stock spindles out of line; the swivel is provided with tangent screws in order to set it accurately; the table may be fed and reversed automatically or by hand, by lever on front of machine; the cross feed is operated by hand or automatically if so ordered; all straight bearings are scraped to surfaces and all cylindrical bearings are fitted by grinding. The bearing surfaces are carefully protected from emery dust. The feed gearing is completely inclosed in the bed. The head stock is attached to a base plate or protractor, bolted to swivel table, and may be set at right angles, or at 30 degrees for grinding centers; the spindles are made of steel ground to size.

Nos. 5 AND 6 UNIVERSAL GRINDING MACHINES,

STYLE "L."

The description on page 444 is generally applicable to the Nos. 1, 2, 3 and 4 grinding mahines. The machine which is illustrated on page 446 is somewhat different in construction in ome of its parts. A flexible covering for the guide is provided of somewhat different construcion from those used on Nos. 2 and 3, which keeps them covered in any position of the carriage.

The carriage is traversed by a screw, and the wheel for hand traversing travels with the mery wheel, which keeps it in the same relative position. The lever by which the feed is tarted, stopped and reversed, also travels with this hand wheel, keeping all together, making it very convenient for manipulation.

The reversing device on these machines is somewhat different. Instead of using knurled knobs, collars having a fine adjusting screw are slid upon a rod and secured at any point desired.

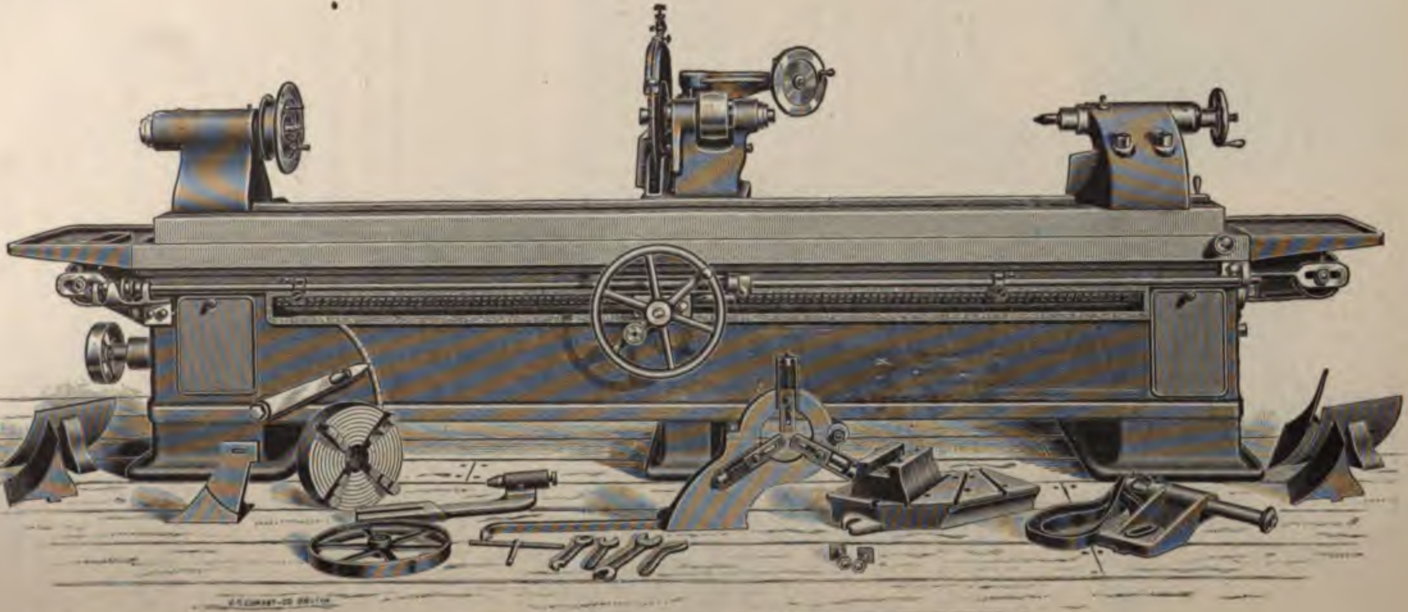
The foot stock spindle is actuated somewhat differently, having a screw as is used on a lathe, with a spring introduced therewith, allowing the work to turn upon a spring tension or otherwise.

Aside from these features, these machines are the same as those described before, embodying the same features of changing the traverse speed and the speed of the work, and providing for water grinding as well as all the other features before described, except that the slow hand traverse is omitted.

The traverse speed in these machines is varied by a lever in front, instead of a hand wheel.

The universal fixtures are similar, with the exception that with these large machines we do not furnish the special cutter grinding chuck and cutter grinding rests.

Traverse speed instantly changed to anything between extremes.



No. 5 UNIVERSAL GRINDING MACHINE, STYLE L.

UNIVERSAL GRINDING MACHINES, STYLE "L."

Nos. 1, 2 and 3 Universal Grinding Machines complete, include all the fixtures as follows:

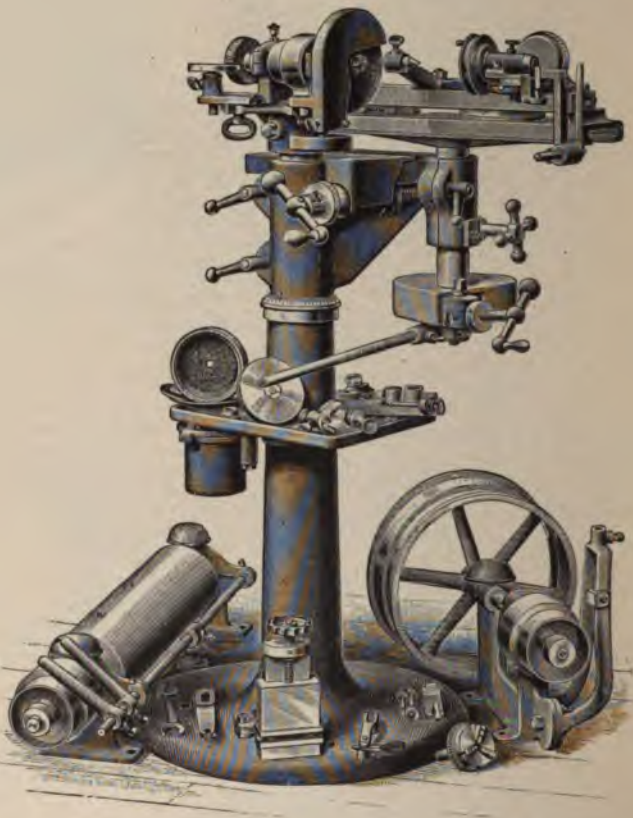
- Pump.
- Cutter chuck.
- Regular chuck.
- Sliding cutter rest.
- Follow rest.
- Center rest.
- Head-stock fitted with steel spindle and adjustable phosphor-bronze boxes.
- Angular base for angular chuck grinding.
- Telescopic water shields.
- Slow hand traverse motion for fine adjustment.
- No. 3 internal grinding fixture, unless otherwise ordered.
- Stationary rest.
- Stationary cutter rest.
- Face plate.
- 3 double-tailed equalizing dogs.
- All necessary wrenches.
- Gear cutter grinding fixture, extra.
- Complete overhead works.

Nos 4, 5 and 6 Universal Machines are supplied with the following:

- Internal grinding fixture.
- Angular base for angular chuck grinding.
- Telescopic water shield.
- 3 double tailed equalizing dogs.
- Head-stock fitted with steel arbor and adjustable phosphor-bronze boxes.
- Center rest.
- Sliding rest.
- Stationary rest.
- Necessary wrenches.
- Complete overhead works.

SPECIFICATIONS.

Code Word.	No.	Swings	Takes Between Centers.	Emery Wheels.			Countershaft.			Weight	Price.
				Diam.	Thickness.	Hole.	Diam. Pulleys	Face.	Rev.		
Gawan.......	1	8″	20″	8″	5/16″	3¾″	8″	3¼″	525	2000	$........
Gazeboo. ...	2	8″	30″	8″	5/16″	3¾″	8″	3¼″	525	2400	$........
Gazeful......	3	12″	42″	12″	½″	5″	8″	3¼″	525	3800	$........
Gazellen ...	3a	16″	42″	12″	½″	5″	8″	3¼″	525	3800	$........
Gazelon	4	12″	66″	12″	½″	5″	8″	3¼″	525	4400	$........
Gazeo........	4a	16″	66″	12″	½″	5″	8″	3¼″	525		$........
Gazetici......	5	20″	96″	18″	¾″	8″	10″	4″	525	11000	$........
Gazeux......	6	20″	144″	18″	¾″	8″	10″	4″	525		$........

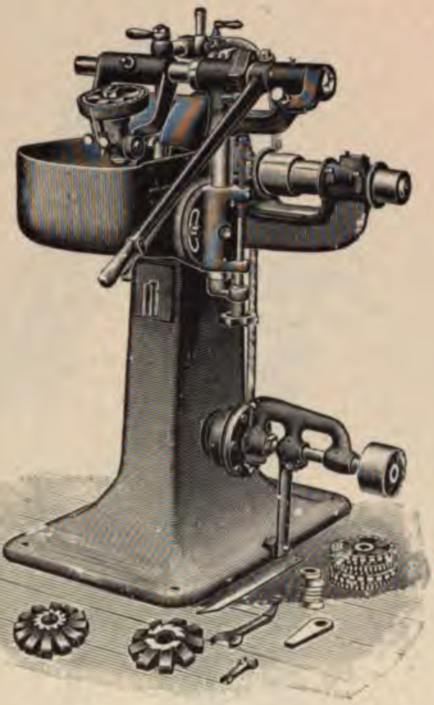


UNIVERSAL CUTTER AND TOOL GRINDER.

The machine illustrated above embodies the latest improvements in this class of machinery. It is especially designed for grinding cutters and reamers although, as its name indicates, it is thoroughly universal in every sense of the word.

GENERAL DIMENSIONS.

Weight complete	500 pounds
Length of table	20¾ inches
Length of horizontal feed	12 inches
Centres will take in length	15 inches
Size of cutter that can be ground	14 inches
Vertical range	3¾ inches
Code Word	Gazifero
Price Complete	$ ....



CORRECT WATER GEAR CUTTER GRINDER.

Milling or gear cutters can be ground radially and equi-distant on this machine keeping the teeth perfectly cool during the operation.

An abundant supply of water being forced on to the cutter from both top and bottom simultaneously, thoroughly deluges cutter and keeps it perfectly cool. Two large emery wheels of a special shape grind the cutters.

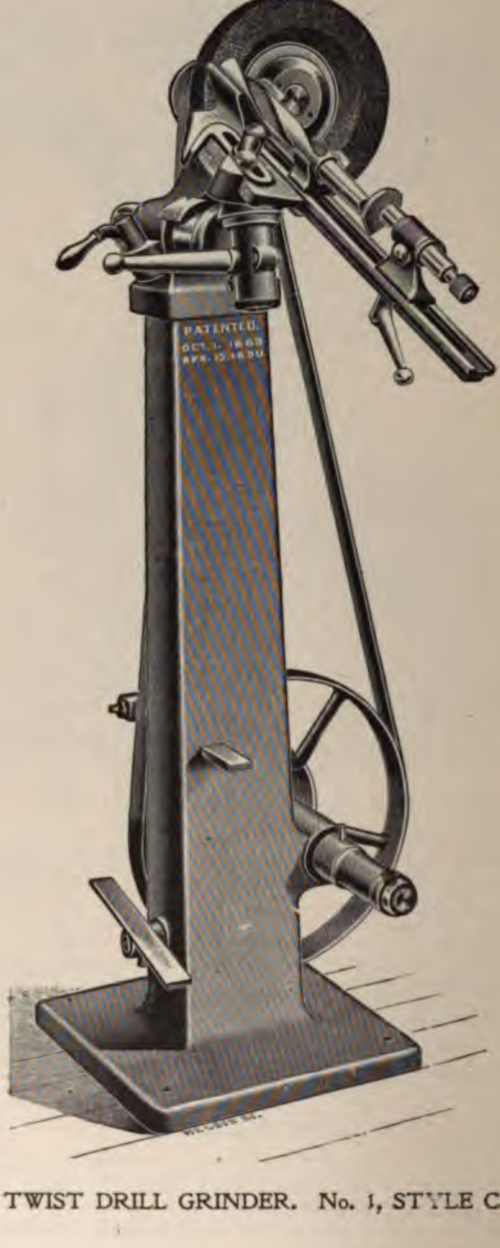
The feed is very short, as the emery wheels grind in towards centre of wheel and not vertically across the face. This saves considerable time in grinding gangs of cutters. Gangs with over two-inch face will necessitate passing around twice, but when grinding those of a smaller face, work can be performed about as quickly as the sharpening of a single cutter.

A skimming pan receives the water directly after it leaves the wheel and frees it from all floating substance and sediment, which would otherwise destroy wearing surfaces.

SPECIFICATIONS.

Code Word.	Size.	Counter Pulleys.	Rev. Per Minute.	Weight About	Boxed Wt. About	Cubic Ft. About	Floor Space About	Price.
Gazipaes.	No. 1	6x3½″	420	725	1100	47	30x50″	$.......
Gaziva..........	No. 2	6x4″	445	985	1375	60	36x60″	$.. ......

This machine can be made to grind the entire cutter, automatically, without attention after being set, at an additional price.



TWIST DRILL GRINDER. No. 1, STYLE C.

TWIST DRILL GRINDERS.

The style "A" grinders are intended for use on a bench having no column—merely the grinder head.

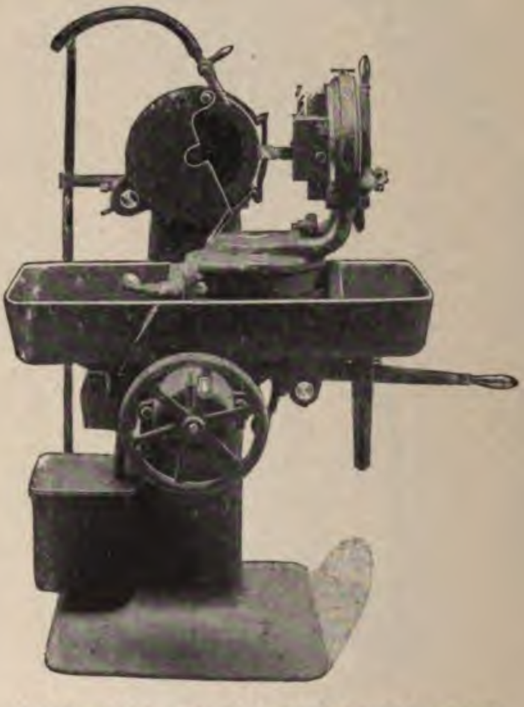
The style "B" grinders are entirely independent of the countershaft.

The style "C" grinders have a countershaft which forms an integral part of the machine.

SPECIFICATIONS.

Code Word.	No.	Style.	Emery Wheel.		Spindle Pulley.		T & L Pulleys on Countershaft		Speed.		Shipping Weight.		Price Including Emery Wheel.	
			Diam.	Thickness.	Diam.	Face.	Diam.	Face.	Emery Wheel.	Countershaft.	With Countershaft.	Without Countershaft.	With Countershaft.	Without Countershaft.
Gazmiar........	1	A	9″	1½″	3″	1⅞″	4¾″	2⅜″	1200 rev.	250 rev.	150 lbs.	100 lbs.	$65 00	$55.00
Gazmieis......	1	B	9″	1½″	3″	1⅞″	4¾″	2⅜″	1200 rev.	250 rev.	225 lbs.	175 lbs.	70.00	60.00
Gazmol.........	1	C	9″	1½″	3″	1⅞″	7″	2⅜″	1200 rev.	250 rev.	200 lbs.		75.00	
Gazola..........	2	A	6″	1¼″	2½″	1⅞″	4¾″	2⅜″	1700 rev.	300 rev.	125 lbs.	75 lbs.	45 00	55.00
Gazlyte........	2	B	6″	1¼″	2½″	1⅞″	4¾″	2⅜″	1700 rev.	300 rev.	200 lbs.	150 lbs.	60.00	50.00
Gazometre....	2	C	6″	1¼″	2½″	1⅞″	7″	2⅜″	1700 rev.	300 rev.	175 lbs.		65.00	

Code words apply to machine with countershaft.



UNIVERSAL TOOL-GRINDING MACHINE.

UNIVERSAL TOOL-GRINDING MACHINE.

FOR GRINDING LATHE AND PLANER TOOLS.

The machine illustrated herewith is simple in construction. There is a column in which is journaled the emery wheel arbor. Through this column is forced a heavy circular arm, upon which a pan supporting the tool-holder oscillates. The pan is also arranged to be moved transversely on this arm. It will be readily seen from this and an inspection of the illustration that a tool held as represented may be brought against the face of the emery wheel and carried across it forward and back by oscillating the pan by means of the lever at the right of the machine.

The tool holder is arranged to slide in the pan in a direction parallel to the arbor. The tool to be ground is held in this, and may be moved about four different centers, as follows:

First. If the tool is bent it may be moved 30 degrees either side of the center line to bring the face to be ground parallel to the face of the emery wheel.

Second. A tool may be rotated through the full circle about its own axis as a center, as for grinding the sides and top.

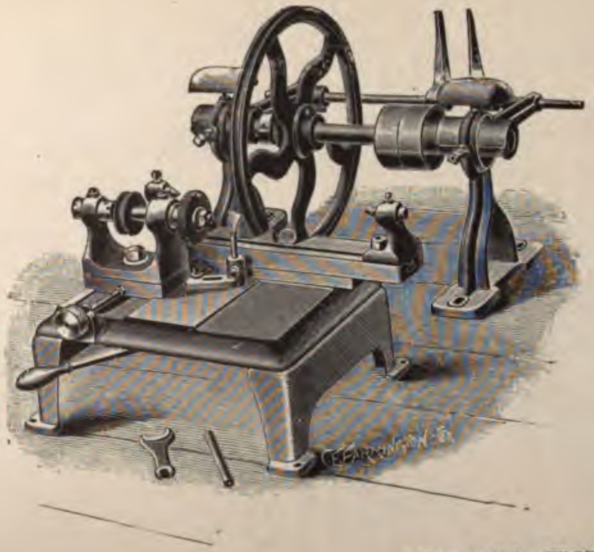
Third. A tool may be rotated through 320 degrees in a horizontal plane for grinding the angular faces.

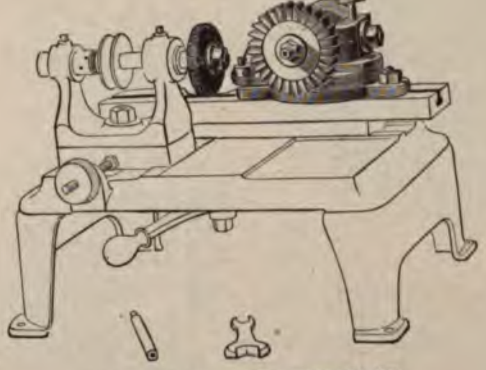
Fourth. The entire tool holder may be rotated in the base to the extent of 15 degrees on either side of the horizontal for the purpose of obtaining clearance. Any required clearance can be had, as on thread tools, without distorting the top angle, and without calculations.

The arbor of the machine is of crucible steel, ground on dead centers and fitted to bronze boxes by scraping. The boxes are adjusted by nuts on either end. End thrust is taken by a hardened steel collar against vulcanized fibre washers.

An arrangement is provided for circulating water. This may be used, or not, according to requirements.

Code Word, Gazuza. Price, $.........................





ROTARY ATTACHMENT.

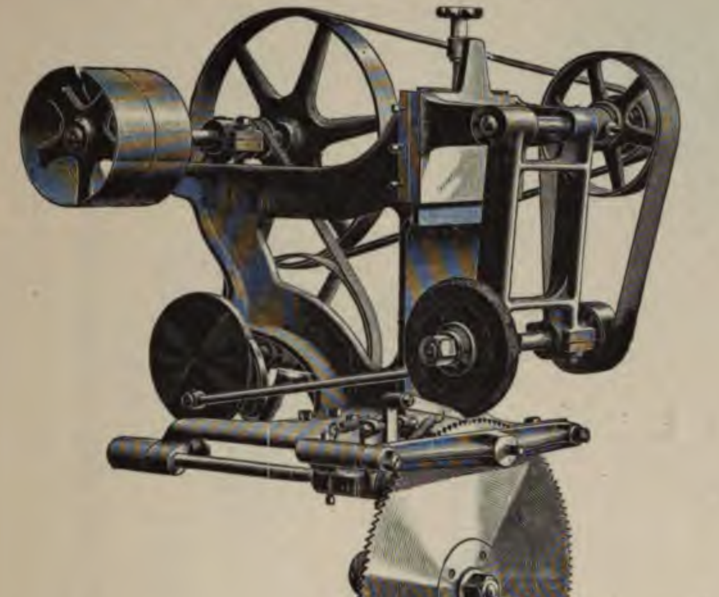
BENCH CUTTER GRINDER.

Light and convenient, but accurate and efficient. Grinds mills to 5 inches diameter and 5 inches long, either straight, taper or spiral; also takes between centres, arbors or reamers 12 inches long. Both emery wheel stand and cutter bed can be set at an angle. Within its limits combine many of the best features of higher cost mill grinders. Included in price is countershaft, self-oiling boxes, wrench and emery wheel. Wheels from ¾ to 4 inches diameter can be used.

With this machine can be had a new rotary attachment, just introduced, which doubles the value of the machine. This has a graduated base laid off in degrees, the upper half revolving to an entire circle. The front part of the upper section has a vertical movement, adjusted by the milled head screw shown. Speed of counter about 300 revolutions per minute.

Code Word, Gazoso. Price $..................

Code Word, Rotary Attachment, Geada. Price $..................



SAW SHARPENING MACHINE.

WITH AUTOMATIC FEED.

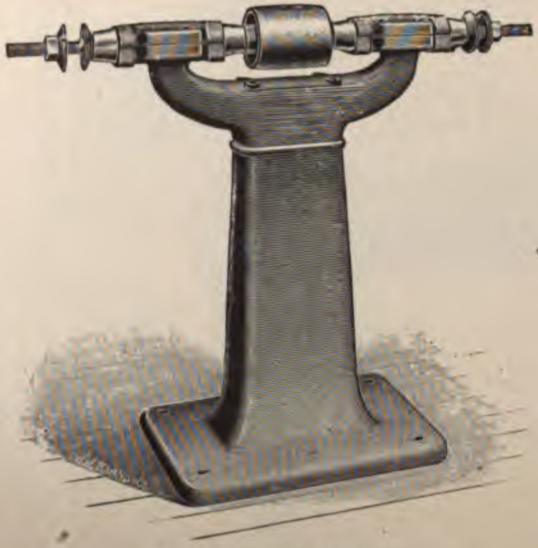
he machine for sharpening cold cutting saws, shown by the above illustration, will sharpen utomatically, 36 inches or less in diameter, at the rate of fifty teeth per minute, making ooth the proper shape, and the saw perfectly round.

PEED—The tight and loose pulleys are 6 inches diameter and 3 inches face, and should 5 revolutions per minute. Weight, 400 pounds.

rice, $ ....

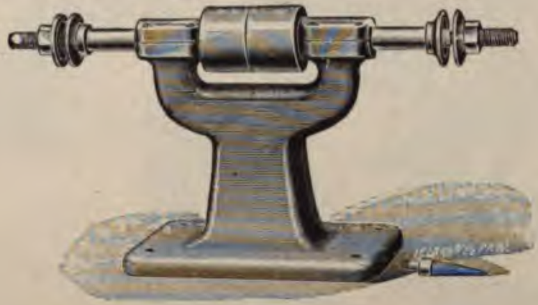
ode word, Gazzarra.

ith slight modifications these machines can be furnished for sharpening saws 48 inches meter, or larger, if required.



POLISHING MACHINE.

14-INCH.



POLISHING HEAD.

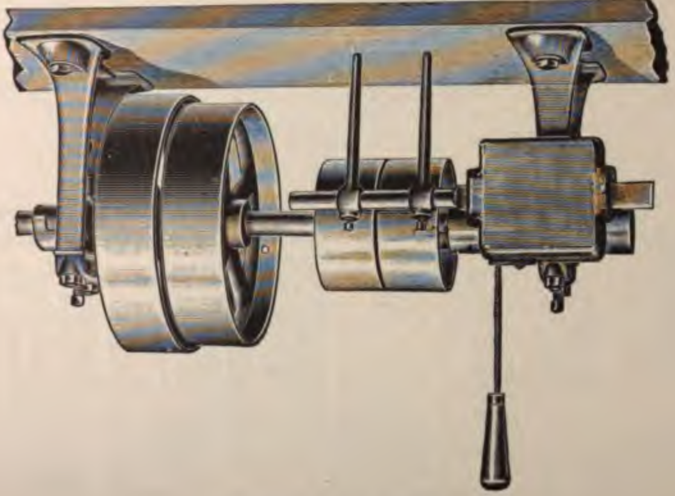
10-INCH.

This head is furnished with single or tight and loose pulleys as desired.

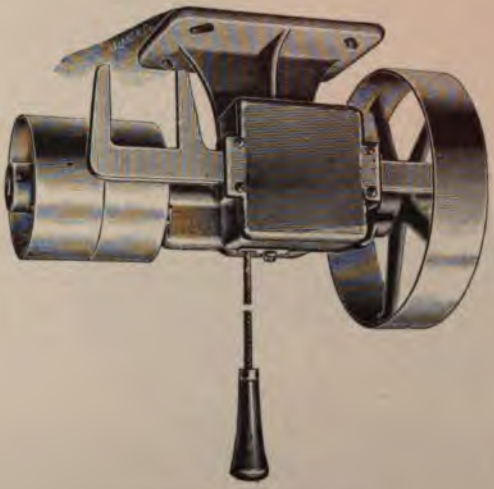
DIMENSIONS OF POLISHING HEADS.

Code Word.	Size.	Base.	Height From Face to Center of Spindles.	Diam. of Spindles.		Bearings.	Lengths.			Pulleys.			Weight Ready For Shipm'nt
				In Boxes.	Between Flanges.		Spindle.	Between Wheels.	Over All.	Single.	Tight and Loose.	Cone.	
Geaehrt ...	8"	6 x 9"	8"	¾"	½"	2¼"	18"	13"	21"	2 x1 9/16"	2 x1 9/16"		20 lbs.
Geaeste....	10"	8 x12"	10"	1"	¾"	3¼"	24"	17½"	27"	3 x2¼"	3 x2¼"		45 lbs.
Geangeld	12"	9½x15"	12"	1¼"	1"	4⅛"	36"	26½"	39"	4½x4¼"	4½x3¼"	4 &5 x3¼"	90 lbs.
Geankert .	12"	16 x21"	39"	1⅜"	1"	10½"	43½"	32"	46½"	4½x4¼"	4¼x3¼"	4¼ &5¼x3¼"	275 lbs.
Geants.....	14"	20 x27"	39¼"	1⅝"	1¼"	13¼"	54"	40"	58"	6 x6½"	6 x4¼"	5¼ &6¼x4¼"	380 lbs.
Gearbeid..	15"	11 x18"	15"	1⅝"	1¼"	14"	51"	40"	58"	6 x6½"	6 x4¼"	5¾ &6¼x4¼"	215 lbs.

Suitable columns either with or without tables, and countershafts for these polishing heads can be furnished if desired. The Code Words apply to the heads with single pulleys.



DOUBLE HANGER.



SINGLE HANGER

PATENT COUNTERSHAFT, SELF-OILING.

These countershafts have self-oiling loose pulleys and self-oiling bearings.

The oil reservoirs are so constructed that by once filling the countershaft will run for a long time without attention.

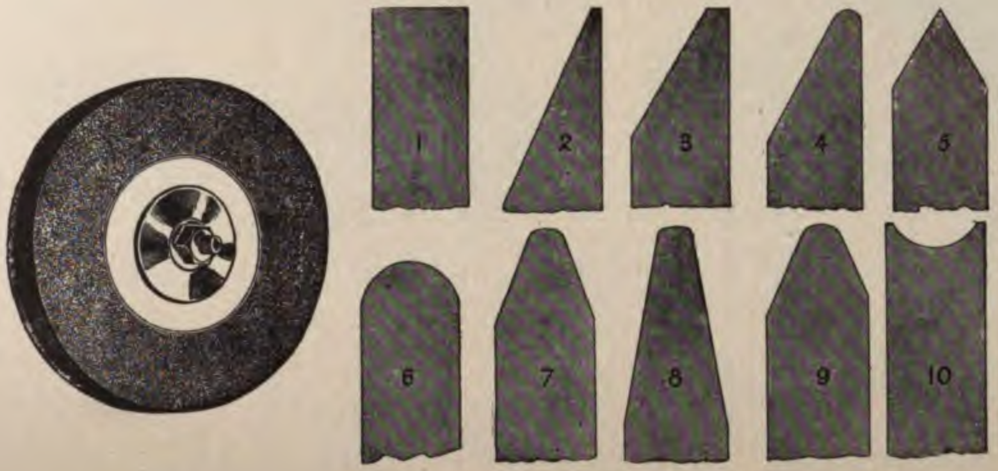
These countershafts are particularily designed for use with grinding and polishing heads, but are very desirable for use with all kinds of light machines.

PRICE LIST OF COUNTERSHAFTS

With Patent Belt-Shifters.

Code Word.	Size.	Price.	Tight & Loose Pulleys. Diam. & Face.	Driving Pulley Diameter and Face.	Drop of Hanger	Diam. of Shaft.	Weight	Style.
Gekheid.......	A	$ 6.50	4x1¾"	8x1¾"	4½"	⅞"	35 lbs	SINGLE HANGER See Page 458
Gekibbel	B	8.00	5x2¼"	10x2¼"	5¾"	⅞"	45 lbs	
Gekicher	C	9.50	6x2¾"	12x2¾"	7"	15/16"	75 lbs	
Gekippt.......	D	12.00	7x3¼"	13x3¼"	9"	1 5/16"	15 lbs	
Gekittet.......	E	12.25	7x3¼"	14x3¼"	9"	1 5/16"	15 lbs	
Gekkende.....	F	14.00	7x3¼"	13 & 14x3¼"	9"	1 5/16"	30 lbs	TWO HANGER See Page 458
Gekker.........	G	14.75	8x3¾"	15x3¾"	9"	1 5/16"	30 lbs	
Geklappt.....	H	15.00	8x3¾"	16x3¾"	9"	1 5/16"	30 lbs	
Geklebt........	I	17.00	8x3¾"	15 & 16x3¾"	9"	1 5/16"	55 lbs	
Geklim.........	J	17.50	9x4¼"	17x4¼"	12"	1 7/16"	50 lbs	
Geklirr.........	K	17.75	9x4¼"	18x4¼"	12"	1 7/16"	150 lbs	
Geklopft..	L	20.00	9x4¼"	17 & 18x4¼"	12"	1 7/16"	180 lbs	

Others sizes of pulleys can be furnished instead of those listed.



EMERY WHEELS.

Special shapes can be furnished; those shown have become standard and can be supplied from stock.

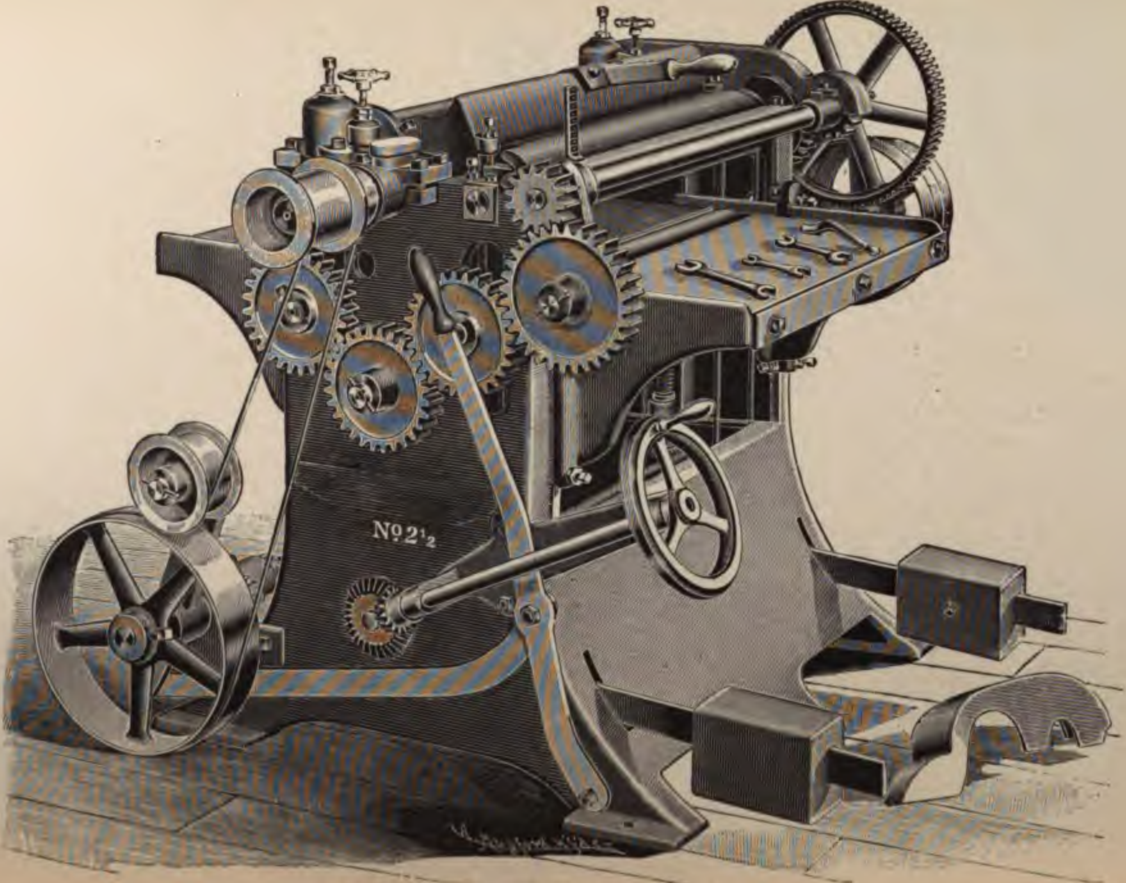
PRICE LIST OF REGULAR EMERY WHEELS.

Diam. in Inches.	THICKNESS OF WHEELS IN INCHES.																		Revolutions per minute.	
	¼	⅜	½	⅝	¾	⅞	1	1¼	1½	1¾	2	2¼	2½	2¾	3	3¼	3½	4	Min.	Max.
1	25	30	30	35	35	40	40	45	50	55	60	65	70	75	80	85	90	1 00	13,000	18,000
1½	30	35	40	45	45	50	50	55	60	65	70	75	80	85	90	95	1 00	1 10	10,500	14,000
2	35	45	50	55	55	60	60	65	70	75	80	85	90	95	1 00	1 05	1 10	1 20	7,900	11,000
2½	40	55	65	70	75	80	85	95	1 05	1 15	1 25	1 35	1 45	1 55	1 65	1 75	1 85	2 05	6,330	8,800
3	50	65	80	90	95	1 05	1 10	1 25	1 40	1 55	1 70	1 85	2 00	2 15	2 30	2 45	2 60	2 90	5,275	7,400
3½	60	80	95	1 05	1 05	1 25	1 35	1 55	1 75	1 95	2 15	2 35	2 55	2 75	2 95	3 15	3 35	3 75	4,500	6,300
4	75	95	1 10	1 25	1 35	1 50	1 60	1 85	2 10	2 35	2 60	2 85	3 10	3 35	3 60	3 85	4 10	4 60	3,950	5,500
4½	90	1 10	1 25	1 40	1 55	1 70	1 85	2 15	2 45	2 75	3 05	3 35	3 65	3 95	4 25	4 55	4 85	5 45	3,500	4,900
5	1 00	1 20	1 40	1 60	1 80	2 00	2 20	2 60	3 00	3 40	3 80	4 20	4 60	5 00	5 40	5 80	6 20	7 00	3,160	4,400
6	1 40	1 60	1 75	2 10	2 40	2 75	3 05	3 70	4 35	5 00	5 65	6 30	6 95	7 60	8 25	8 90	9 55	10 85	2,640	3,700
7	1 85	2 00	2 15	2 60	3 00	3 45	3 85	4 70	5 55	6 40	7 25	8 10	8 95	9 80	10 65	11 50	12 35	14 05	2,260	3,160
8	2 10	2 35	2 60	3 10	3 60	4 10	4 60	5 60	6 60	7 60	8 60	9 60	10 60	11 60	12 60	13 60	14 60	16 60	1,980	2,770
9	2 50	2 80	3 10	3 70	4 25	4 85	5 40	6 55	7 70	8 85	10 00	11 15	12 30	13 45	14 60	15 75	16 90	19 20	1,760	2,460
10	3 00	3 35	3 65	4 35	5 00	5 70	6 35	7 70	9 05	10 40	11 75	13 10	14 45	15 80	17 15	18 50	19 85	22 55	1,580	2,210
12	3 60	3 80	4 00	5 00	6 00	6 70	7 40	9 00	10 70	12 75	14 00	15 70	17 40	19 00	20 75	22 50	24 25	27 50	1,320	1,850
14	4 05	5 15	6 25	7 35	8 45	9 55	10 65	12 85	15 05	17 25	19 45	21 65	23 85	26 05	28 25	30 45	32 65	37 05	1,130	1,580
16					10 85	12 30	13 70	16 55	19 40	22 25	25 00	27 95	30 80	33 65	36 50	39 35	42 20	47 90	990	1,380
18					13 25	15 15	17 00	20 75	24 50	28 25	32 00	35 75	39 50	43 25	47 00	50 75	54 50	62 00	880	1,230
20							20 25	24 75	29 25	33 75	38 25	42 75	47 25	51 75	56 25	60 75	65 25	74 25	790	1,100
22							25 00	31 00	37 00	43 00	49 00	55 00	61 00	67 00	73 00	79 00	85 00	97 00	720	1,000
24							29 00	36 00	43 00	50 00	57 00	64 00	71 00	78 00	85 00	92 00	99 00	113 00	660	920
26								43 00	51 00	59 00	67 00	75 00	83 00	91 00	99 00	107 00	115 00	131 00	600	850
30									61 00	72 00	83 00	94 00	105 00	116 00	127 00	138 00	149 00	171 00	500	735

Code word for "Emery wheel(s)," Geklutst.

PART XXIX.

WOOD-WORKING MACHINES.



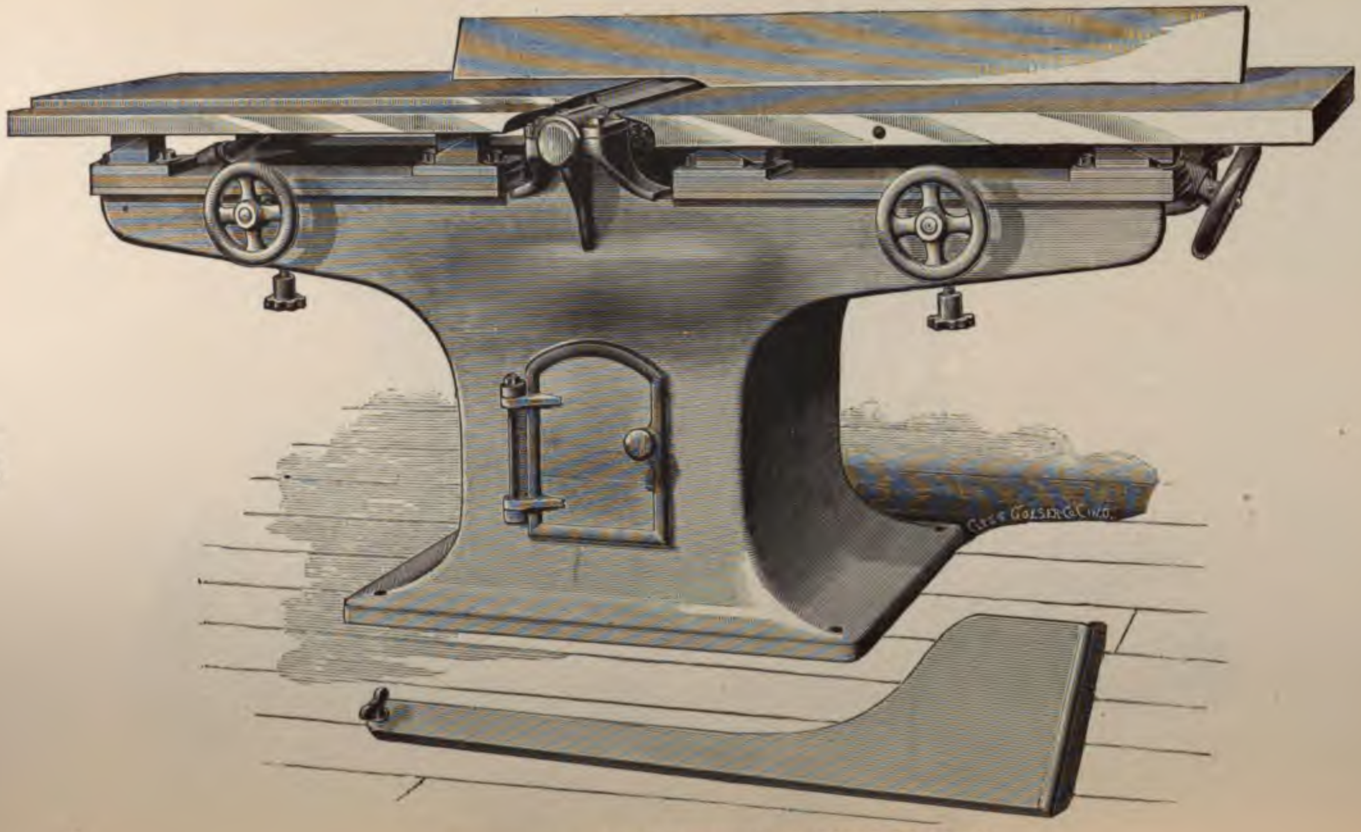
DOUBLE BELTED SURFACE PLANER.

DOUBLE BELTED SURFACE PLANER.

The cylinder of this planer is a solid steel forging, has large bearings and ample oil cups. Feed rolls are set very close to the cylinder. The upper roll is fluted and pressure is obtained by means of weighted levers. A suitable cone pulley permits a wide range of feeds.

SPECIFICATIONS.

Code Word.	Width Planed.	Thickness Planed.	Countershaft Pulleys.			Weight.	Price.
			Diam.	Face.	Speed.		
Gekoer.........	20″	$\frac{1}{16}$ to 7″	10″	6¼″	900	2000 lbs.	$........ ....
Gekolkt........	24″	$\frac{1}{16}$ to 7″	10″	6¼″	900	2300 lbs.	$..................
Gekonnt........	28″	$\frac{1}{16}$ to 7″	10″	6¼″	900	2500 lbs.	$.......... ....


Geo. Golser Co. Cin. O.

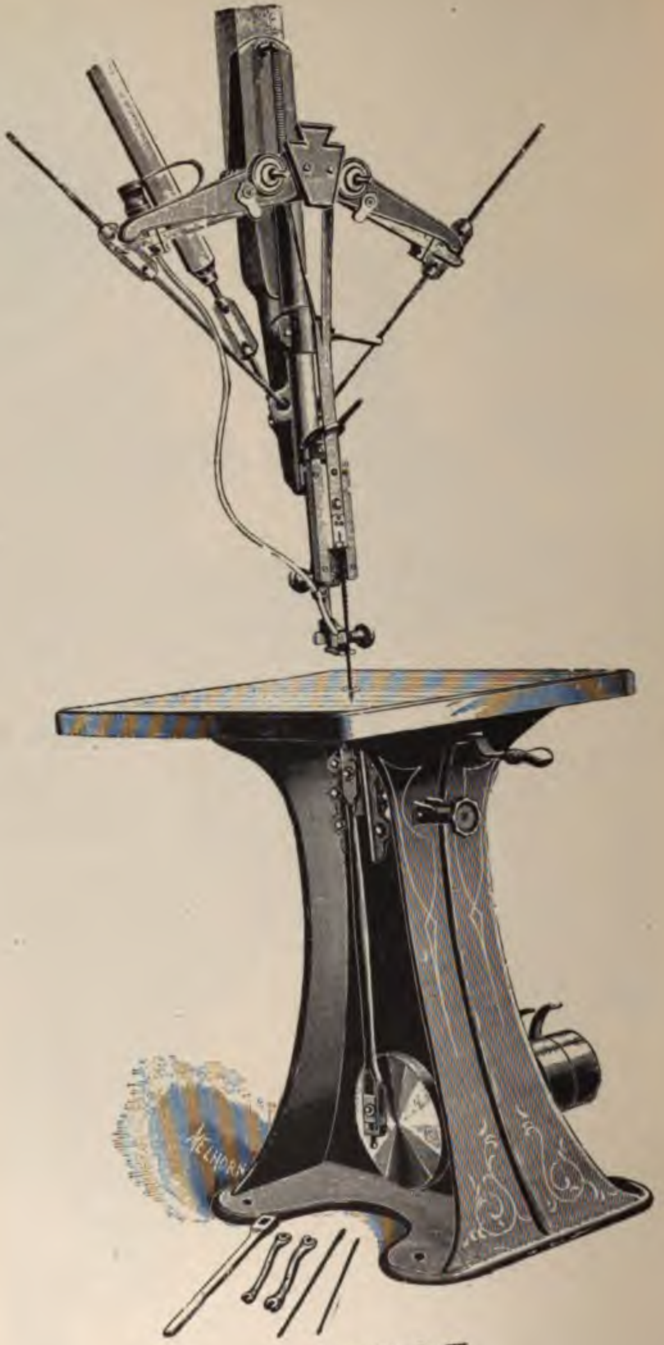
IMPROVED HAND JOINTER OR BUZZ PLANER.

IMPROVED HAND JOINTER OR BUZZ PLANER.

This machine is capable of a large variety of work. Each table has independent, vertical and lateral adjustment. The cylinder is of solid forged steel and designed to carry either straight or rabbeting knives. The table is provided with an adjustable gauge which can be set square or at any desired bevel.

SPECIFICATIONS.

Code Word.	Width Worked.	Countershaft Pulleys.			Weight.	Price.
		Diam.	Face.	Speed.		
Gekraut........	8"	8"	4"	780	1050 lbs.	$..........................
Gekrevel.......	12"	8"	4"	780	1300 lbs.	$..........................
Gekriel	16"	8"	4"	780	1550 lbs.	$..........................
Gekroese.......	24"	8"	4½"	780	1900 lbs.	$..........................



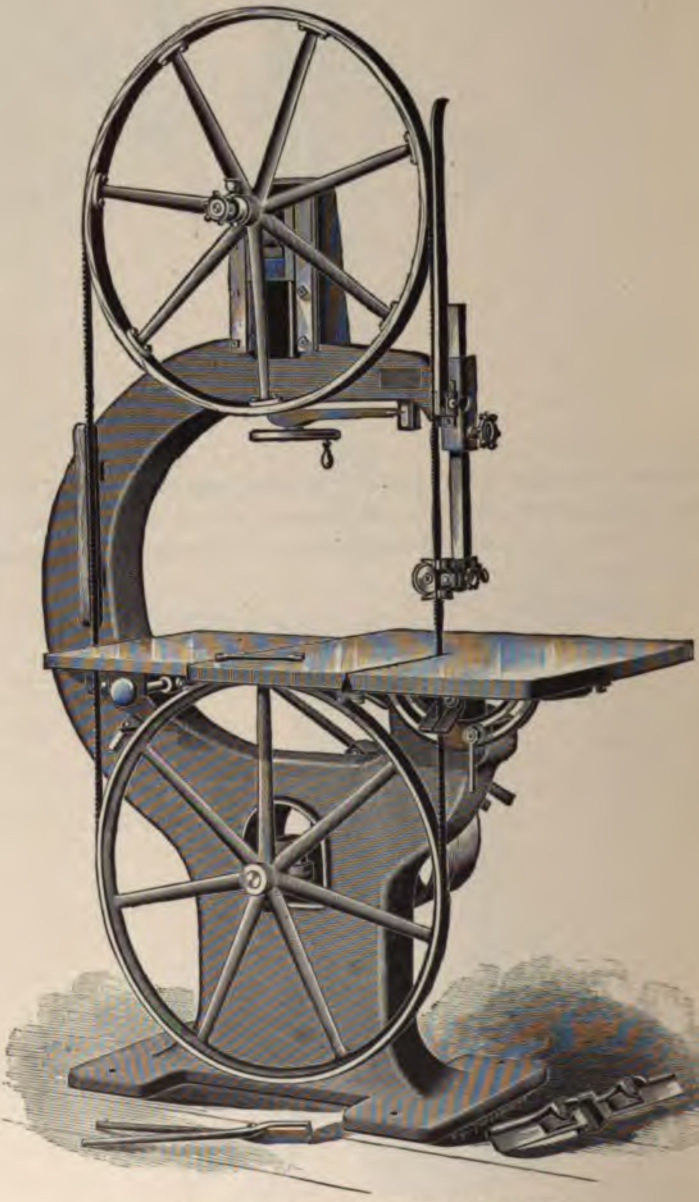
SCROLL SAW.

SCROLL SAW.

This saw can be provided with a stationary or tilting table, as desired. The table is built up of alternate strips of hard and soft wood, fastened to a heavy cast iron plate. The crank shaft carries a friction pulley and combination brake, by which the saw is stopped and started instantly with a single motion of the foot.

SPECIFICATIONS.

Code Word.	Driving Pulleys.			Weight.	Price.
	Diam.	Face.	Speed.		
Gekskap......	8¾"	3"	750	600 lbs.	$..............................



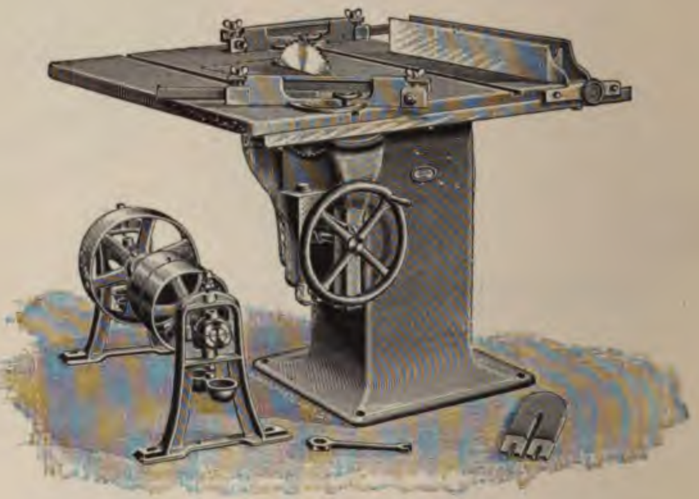
IMPROVED BAND-SAW MACHINE.

IMPROVED BAND-SAW MACHINES.

The wheels of these band-saw machines are provided with special devices for maintaining alignment and taking up wear. The tables (either wood or iron) can be tilted 45 degrees. A patent guide of the most approved pattern is supplied.

SPECIFICATIONS.

Code Word.	Sawing Space.		Width of Saw.		Countershaft Pulleys.			Weight.	Price.
	Depth.	Height	Smallest.	Largest.	Diam.	Face.	Speed.		
Gekurkt........	24″	12″	⅛″	½″	12″	3½″	375	950 lbs.	$........
Gekust	30″	14″	⅛″	¾″	12″	3½″	500	850 lbs.	$........
Gekwakt.......	34″	14″	⅛″	1″	12″	3¾″	450	900 lbs.	$........
Gekweel	36″	14″	⅛″	1½″	14″	4½″	400	1250 lbs.	$........
Gelaafd...	37″	16″	⅛″	1½″	16″	5¼″	375	1400 lbs.	$........
Gelable........	42″	20″	$\frac{3}{16}$″	2″	18″	5¼″	350	2000 lbs.	$........

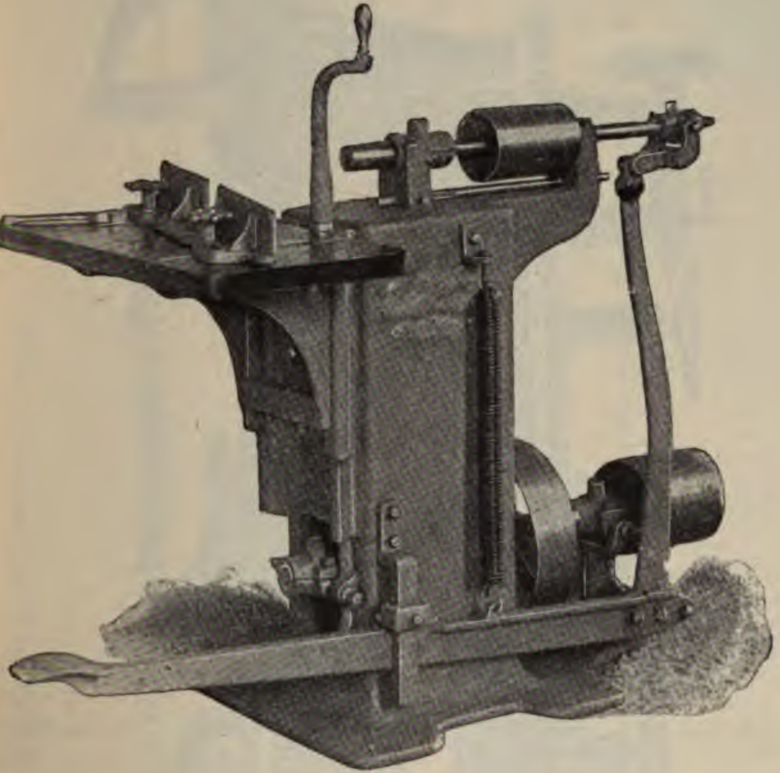


SAW-BENCH.

This saw-bench has an iron table which rises and falls 5 inches in a direct line on gibbed slides, and it also tilts upward from the right hand side to 45 degrees. Iron cutting off and splitting gauges are included in the price of the machine. Jointing, dadoing, grooving, rabbetting and moulding heads may be used. A boring attachment is added when ordered. It has sliding and vertically adjusting table with all necessary stops and gibs, and fence for holding work. The arbor has self oiling boxes carefully scraped to the journal, and there is provision for taking up end motion.

SPECIFICATIONS.

Code Word.	Size of Table.	Largest Saw Used.	Tight and Loose Countershaft Pulleys.			Horse Power.	Weight.	Price.
			Diam.	Face.	Speed.			
Gelalla.........	36x44″	15″	8″	5″	750	3	900 lbs.	$.......

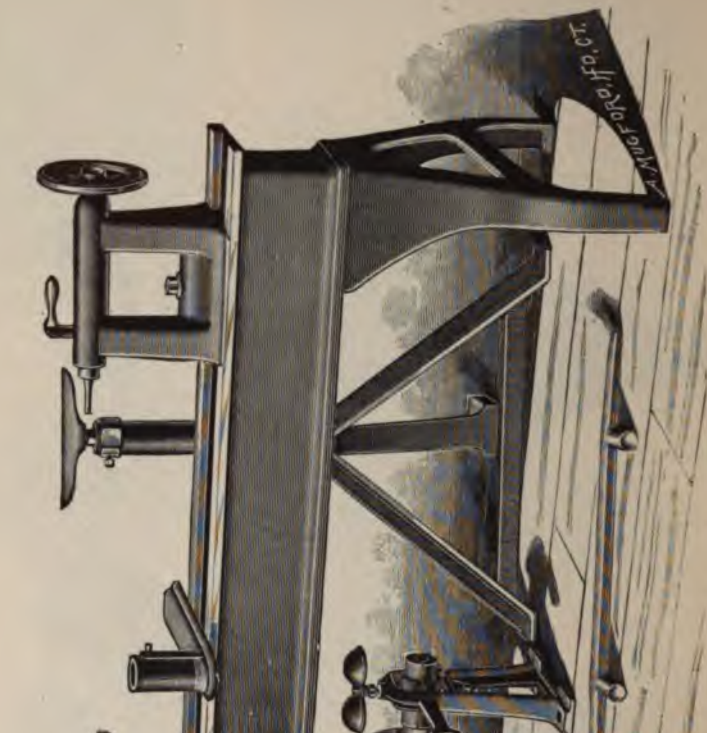


HORIZONTAL BORING MACHINE.

The table is glued up of strips of hard wood. The gauge is adjustable at any angle, and eld by clamps. The table can be lowered by hand-crank to 10 inches. The spindle is ught forward by foot lever, the depth of hole being regulated by stops attached to vertical er.

SPECIFICATIONS.

Code Word.	Style.	Greatest Depth of Hole.	Countershaft Pulleys.			Weight.	Price.
			Diam.	Face.	Speed.		
lapt........	1	4½"	7"	3¼"	1200	560	$............
lati...........	2	12"	8"	3¾"	1000	750	$......


A. MUGFORD, HFD, CT.

IRON-BED PATTERN MAKER'S LATHE.

IRON-BED PATTERN MAKER'S LATHE.

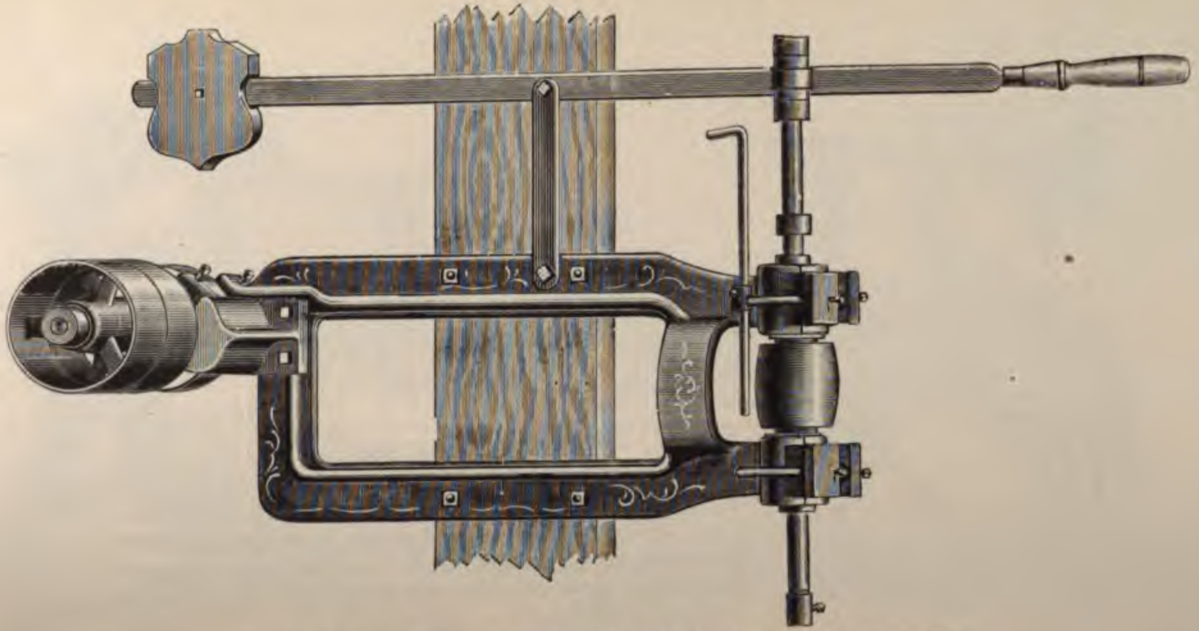
This lathe is provided with steel spindles and centers and babbet lined bearings. The head stock cone is of iron; countershaft cone of wood glued up in layers with cross grain. A geared carriage with rack, suitable hand crank, cross feed screw and tool post can also be furnished, when desired, at an extra price.

SPECIFICATIONS.

Code Word.	Swing.	Countershaft Pulleys.			Weight. 8′ bed.	Weight per Extra Foot of Bed.	Price.
		Diam.	Face.	Speed.			
Gelatos.........	16″	8″	3½″	650	1000 lbs.	50 lbs.	$........................
Gelatum	20″	9″	4½″	625	1250 lbs.	60 lbs.	$....... ....
Gelaturi......	24″	10″	4½″	600	1400 lbs.	65 lbs.	$........................

Standard lengths of bed are 8′ 10′ and 12′.

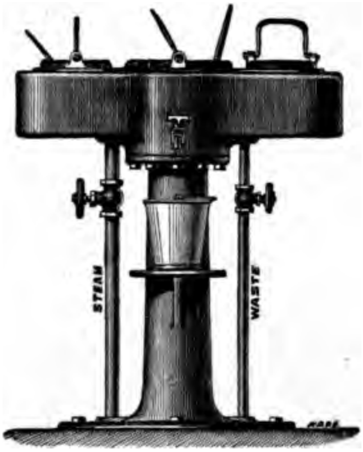
When the iron bed is not desired, suitable head and tail stocks and rests complete and ready for mounting on wooden beds can be furnished.



NEW PATTERN POST-BORING MACHINE.

SPECIFICATIONS.

Code Word.	Countershaft Pulleys.			Weight.	Price.
	Diam.	Face.	Speed.		
Gelbgans......	6"	3"	800	300 lbs.	$.................. ....



STEAM GLUE HEATER.

FOR PATTERN SHOPS, CABINET SHOPS, BOOK-BINDERS, ETC.

These heaters are constructed with double plate throughout, so that the pots do not come in contact with the steam or water, and hence are secure from leaking and can be placed with safety on upper floors or in any room.

The steam chamber is cast in one piece, and there is but a single joint, and that where the flange is bolted on at the bottom, and this, being a plain flat one, is perfectly secure from leaking.

Steam and waste pipes, with screw valves, are fitted on each side, as shown, and on the front is a faucet for drawing off hot water.

The pots are of iron, zinc-plated, and are turned at the flanges, so as to make a tight joint, and prevent the loss of heat.

The central pot, used for melting, holds one gallon, and those at the ends one-third gallon each. A zinc water-bucket, to hold one gallon, is also included.

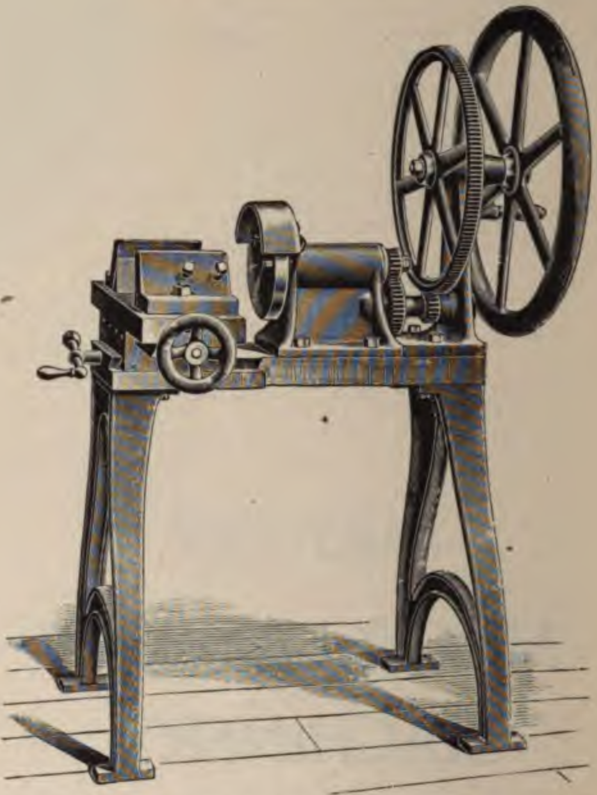
Each heater is tested with steam, at a pressure of 60 lbs. to an inch, to detect leaks.

Code Word, Gelbreif.

Price $ .. ..

PART XXX.

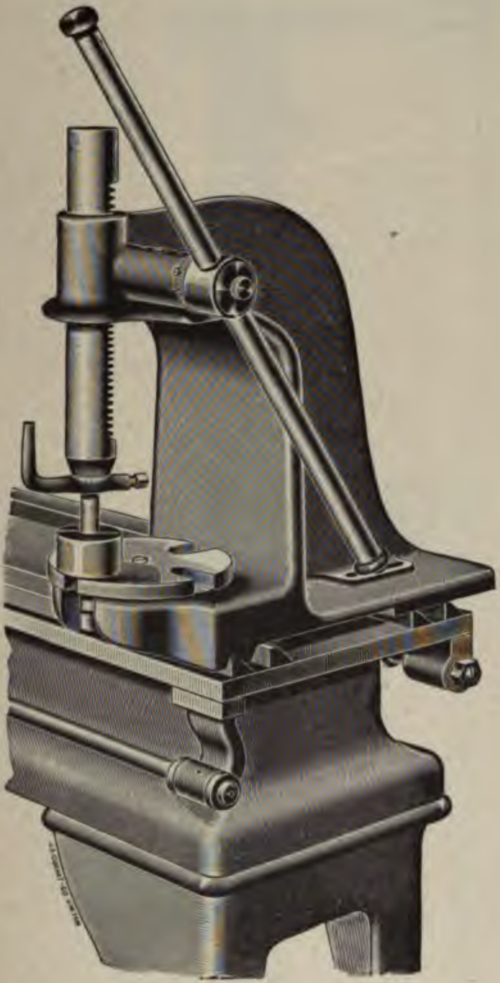
MISCELLANEOUS MACHINERY.



PORTABLE LOCOMOTIVE BRASS FACER.

It is necessary to have the joints or faces of the brasses of a locomotive exactly true with the straps; unless they are so when keyed up, they will wear the straps as well as the brasses. The machine illustrated above is designed to do this work by hand or power; it is made light so that two men can carry it to the work; it has an adjustable chuck that catches the brasses in the same way that the strap does and holds them as held on the pin. When the carriage containing the chuck is brought up to the cutter, a cut from $\frac{1}{1000}$ to $\frac{1}{8}$ of an inch can be taken off. The cutter we recommend for the purpose is a single one placed in a disc adjustable to different diameters; it can be quickly taken out and ground on an ordinary grindstone or emery wheel. This is a useful and rapid working tool and will greatly economize this particular kind of work. We can also furnish a machine, similar to a milling machine for power, for facing boxes, cotter drilling, light milling and drilling. The table has three movements, one vertical and two horizontal. The milling head has a travel of over 9 inches horizontally, making machine capable of a great variety of work.

Code Word, Geldig. Price $..........................

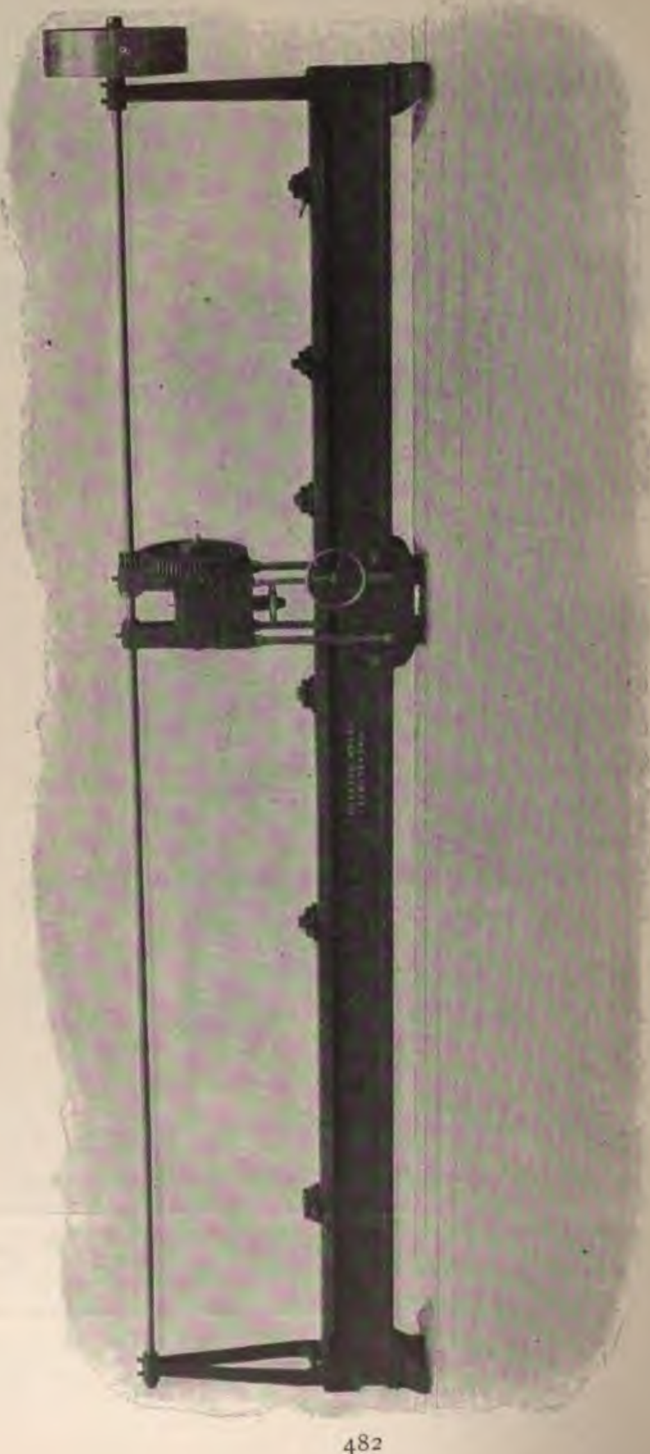


No. 3 Press.

THE GREENERD ARBOR PRESS.

SPECIFICATIONS.

Code Word.	No.	Largest Diameter of Work.	Diam. of Arbors.	Length of Arbors.	Weight.	Net Price.
Geldnarr.......	2	8″	1″	7″	55 lbs.	$13.00
Geldnoth......	3	12″	1½″	9″	90 lbs.	$16.00
Geldpost.......	3½	19″	3″	15″	360 lbs.	$35.00
Geldra.	4	19″	3″	24″	925 lbs.	$75.00



SHAFT-STRAIGHTENING MACHINE.

SHAFT-STRAIGHTENING MACHINE.

This machine is designed for straightening shafting up to 6 inches in diameter, any length.

Machine may be driven directly from line shaft without a counter. The housings are mounted on the bed and are open to allow shafts of any length to project through

The ram is contained in traveling head, which is moved along the bed by rack and pinion. It is operated by power, and the height of ram is regulated by hand-wheel and screw, thus governing the degree of pressure.

The shafting is supported on rollers for revolving and held by "V" blocks on either side of the ram for straightening.

A device for revolving the shafting by power can be supplied when so desired.

The driving pulleys are 36 inches diameter for 5-inch double belt.

Speed, 190 revolutions per minute.

LIST OF SIZES.

Code Word.	Length of Bed.	Weight.	Price.
Nonentity	20′		$
Nonesuch	22′		$
Nonianus	24′		$
Nonidi	26′		$
Nonnada	28′		$
Nonnam	30′		$

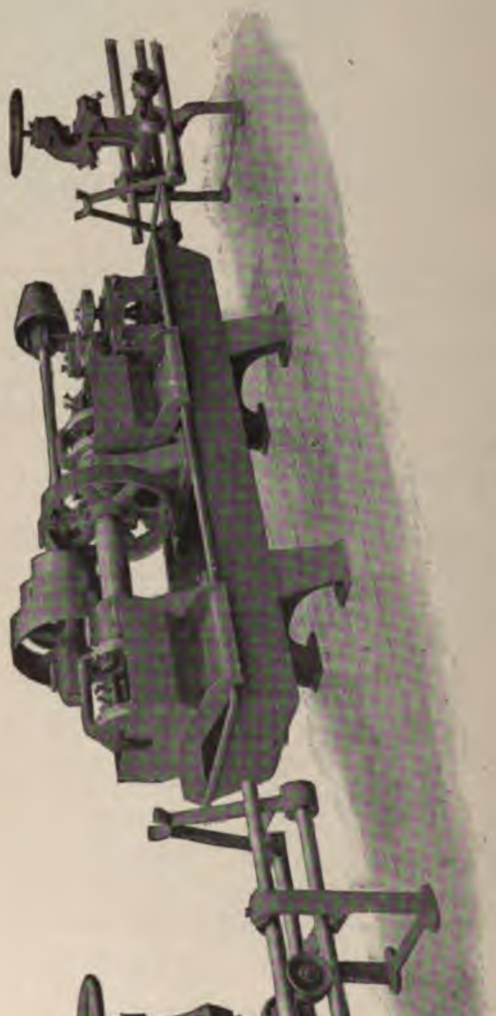


FIG. 1.—SHAFT-TURNING MACHINE.

See page 487.

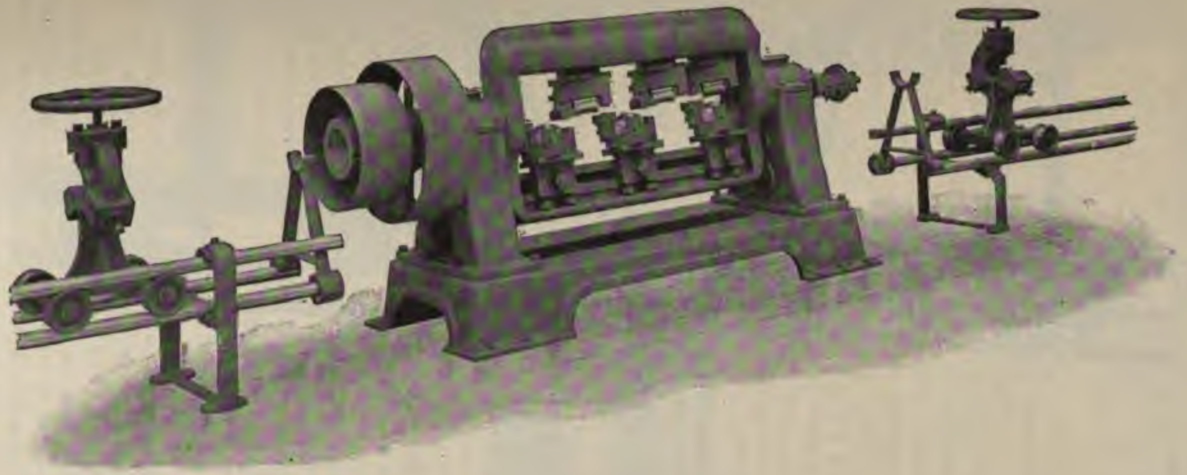


FIG. No. 2—SHAFT-STRAIGHTENING AND FINISHING MACHINE.

See page 487.

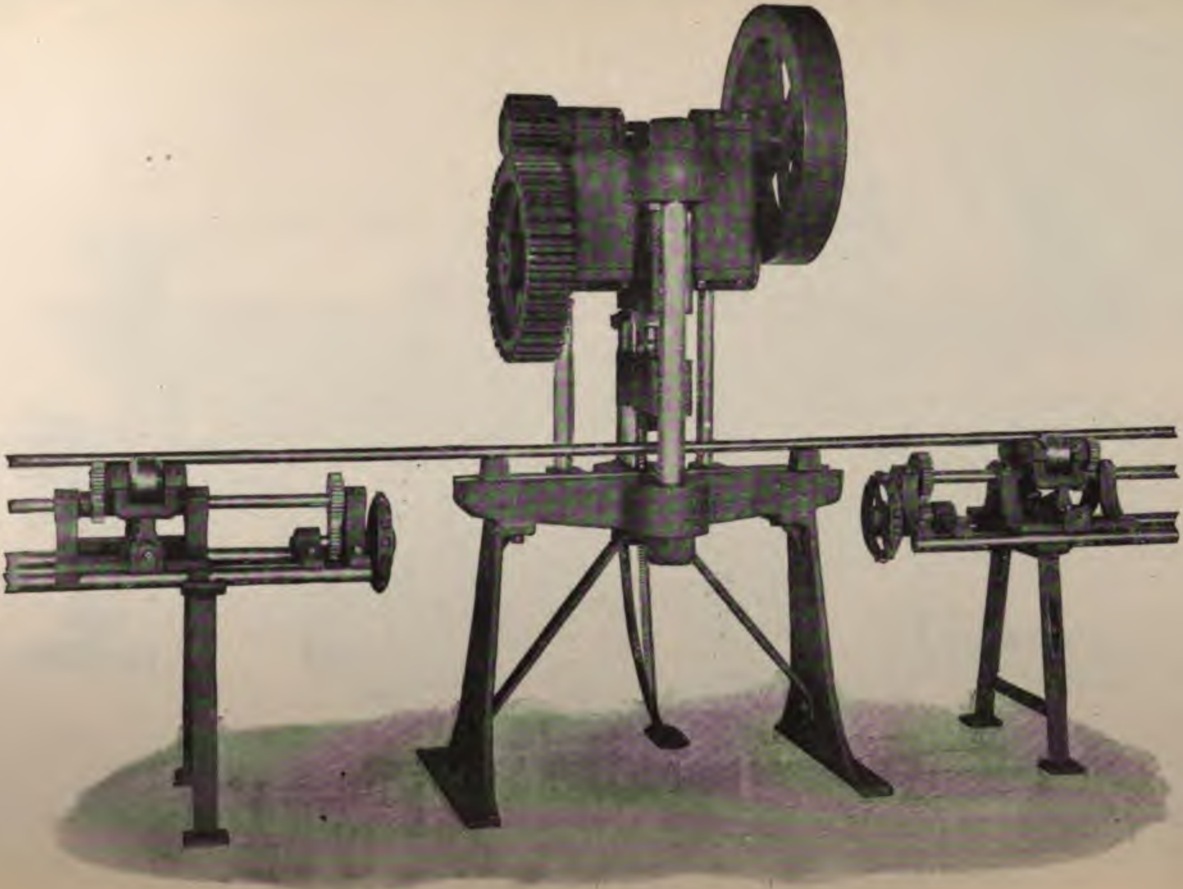


FIG. No. 3.—SHAFT-STRAIGHTENING PRESS.

See page 487.

A NEW PROCESS OF FINISHING, SHAFTING, TUBING, ETC.

By means of this new process of finishing shafting, bronze rods, tubing, etc., it is possible to turn from 1,200 to 1,500 feet of 2-inch shafting in 10 hours.

Taking this size as a base sizes below to ¾ inch and above to 5½ inches can be turned in proportionate quantities. The rough bar, tube or rod is fed in at one end of the turning machine, Fig. 1, by a set of feed rolls, which are driven by worm wheels and worms attached to perpendicular and horizontal shafts having a four-step cone to regulate the feed. The material is centered by a guide placed between these sets of rolls; it has a perpendicular adjustment and the feed rolls make the other adjustment, which is horizontal. The advantage gained in this arrangement is that bars, tubes or rods, with ordinary crooks, bends or kinks, can readily be turned without being first hand-straightened or peened, as is the case with shafting and tubes finished by the old process. Material after leaving the feed rolls enters the roughing head, which reduces it very nearly to size. This head, as well as the finishing head, is composed of a steel cutter and guides set in segmental slots which have a screw adjustment. These heads are bolted to a cylinder having hollow bearings, through which the material passes in the process of turning, and are driven by a gear and pinion. The latter is attached to a horizontal shaft on which are different sizes of pulleys to give various speeds to the machine. After leaving the roughing head the material passes through the hollow cylinder into the finishing head, which turns it to size, and it is then ready for the straightening or finishing machine. The bed of the machine is a receptacle for a solution of soap, which is continually pumped on the cutters by a small pump in the rear of the machine. This solution drains back into the bed and is used over and over again. Boxes that surround the cutter heads are used for holding chips or turnings. They are so arranged with side openings that they can be readily cleaned while the machine is in operation. At each end of the machine tracks are provided traversed by a gripping device which keeps the material from revolving with the machine.

The straightening and finishing machine, figure 2, is for the purpose of straightening rounds in the solid, both rough and finished, steel pipe, bronze rods, tubes, etc. The straightener consists of a bed with upright pedestal bearings, which support a revolving frame having hollow journals, and the straightening mechanism. The latter consists of six rolls having concave surfaces. The rolls are supported by bearing blocks having a swivel and screw adjustment. The roll supports are secured to the revolving frame so as to project alternately from opposite sides, excepting at the discharge end of frame, where two rolls are directly opposite. At each end of the straightener tracks are provided traversed by a gripping device which keeps material to be straightened from revolving.

The contact of the concave rolls in the revolving frame produces varying speeds, according to the amount of concave surface put on the rolls. A certain amount of slipping that is done by the rolls will put on a very fine finish. The rolls are adjusted at an angle to the shaft according to the diameter of the same, each roll having a segmental line of contact with the shaft. This prevents gouging out or breaking of edges of flaws or cracks which might be found in the surface of the material and will admit of such flaws and cracks being smoothed over. This straightener has a very large capacity, and straightens and finishes at the rate of from 15 to 20 feet per minute, according to size and the speed at which it is run.

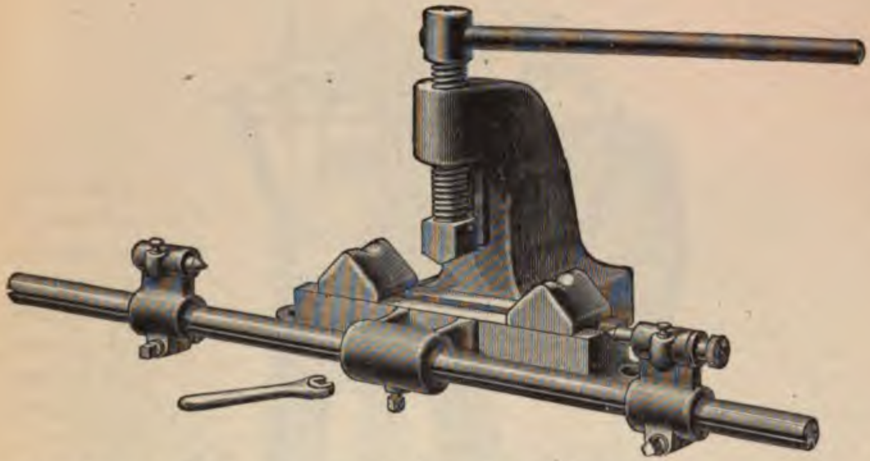
The press straightener, illustrated in Fig. 3, is used in conjunction with the turning machine and straightener. Its purpose is to straighten shafting or rods from ¾ to 5½ inches and tubing up to 10 inches in diameter. The base is mounted on pedestals, braced from each side, and the working mechanism is supported by finished upright shafts bolted at each end. It is driven by a horizontal shaft, on which are attached a band wheel, driving pinion, and gear. The large gear operates a cam shaft. The cam is contained in a bronze box supported by a moving head with cast-iron slides (babbitted), which move up and down on upright supports with the action of the cam. An adjusting screw device is held to place by the upright supports and mounted on heavy coiled springs, which return it to place after each revolution of the cam. The adjustment for the different sizes is effected by a heavy screw contained in the lower sliding head, which can be adjusted up and down at the will of the operator. It is engaged by a foot lever at the bottom of the press, which slides a block in between the moving head and adjusting screw, thus bringing the pressing device in contact with the material to be straighened. At each end of the press are a series of small rolls driven by small gears on long horizontal shafts, and supported by cast-iron frames having adjusting wedges, which admit of the rolls being raised or lowered to suit the different sizes of material operated on. These rolls are operated separately from the press proper and are driven by a countershaft placed in the rear.

Rounds, finished or rough rods, tubes, etc., are revolved by these rolls, and any irregular spot, crok or kink can then be detected. The high spot is marked by the operator and slid under the pressing device, which, by pressing the foot lever attached to the sliding block, engages the lower sliding head and adjusting screw and allows the head to press the material on the high spot to be straightened. This machine is used only in conjunction with those illustrated in the first two engravings, when material is to be absolutely straight, and in fact, is only a verifier or testing machine to prove the work of the straightener.

Each of the machines is made in two sizes. The smaller size finishes shafting from ¾ inch to 2-inch diameters; the larger from 1½-inch to 5½-inch diameters.

SHIPPING WEIGHTS AND CODE WORDS.

Name of Machine.	For Finishing Shafting from ¾ to 2 inches diam.		For Finishing Shafting from 1½ to 5½ inches diam.	
	Code Word.	Weight.	Code Word.	Weight.
Turning Machines..................	Geleira	6000 lbs.	Geleund........	10,000 lbs.
Revolving Roll Straightener...	Geleisig..	6000 lbs.	Gelhas..........	12,000 lbs.
Press Straightener..................	Gelenk	3500 lbs.	Geliate	10,000 lbs.



COMBINATION SHAFTING STRAIGHTENER AND CENTERS.

The above machine is intended to be placed upon the bench in the machine shop, or tool room, to be used when centering work by hand, or for straightening work centered by hand or machine.

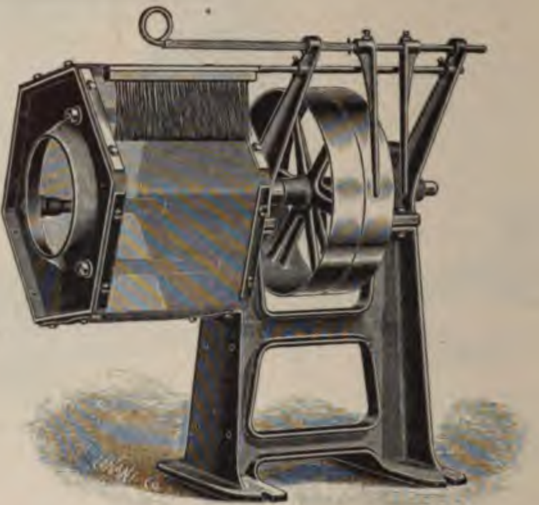
It is a well known fact that work straightened in a press is more likely to remain straight when turned than when hammered straight. It is not only valuable for centering and straightening work in the rough, but for straightening pieces which have been accidentally sprung in use; or reamers, etc., which have been sprung in tempering.

This machine by combining in a convenient form, the centers for testing, and the press for straightening work, obivates the necessity of walking to and fro from lathe to anvil, block or press, and has all the advantages for small work which the large presses have for straightening shafting, etc.

GENERAL DESCRIPTION.

The blocks upon which the work rests are kept in line by tongues which fit the groove shown, and are movable to and from the screw. The screw is 1⅜ inches diameter, 4 pitch, of steel, and powerful enough to bend a shaft 1¾ in. diameter. The shaft upon which the centering heads are fitted, is cold rolled, 1¼ in. diameter, 49 in. long. It is movable through the arm which supports it, and is held in any desired position by the set screw shown. The centering heads are clamped in any position on the shaft, by the binding screws shown. The center at the right is pressed forward by a spring and has a knurled head for drawing it back; both centers are provided with small oil wells, with brass fittings, for convenience in oiling centers. The body of the machine has three lugs cast upon it for bolting to the bench. The block on the end of the screw is cast steel, case hardened, and the centers, tool steel, tempered. This machine should find a place in any machine shop where small work is turned, as its convenience can be readily appreciated.

Code word, Gelidity. Weight, 130 lbs. Price, $..........................

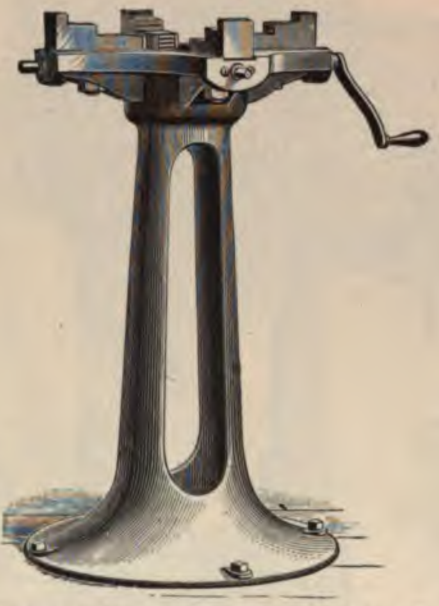


IMPROVED AUTOMATIC SAND SIFTER.

This machine is provided with easily removable wire netting which can be furnished with meshes to suit. A long steel brush striking against the side of the drum as it revolves prevents all clogging. Three heavy iron bars running through the drum break up the lumps of sand. The No. 2 machine is exactly similar to the No. 1 except that both ends of the shaft carry a sifter. With the No. 1 machine one man can easily sift 60 tons of sand per day.

SPECIFICATIONS.

Code Word.	No.	Floor Space.	Countershaft Pulleys.			Weight.	Price.
			Diam.	Face.	Revs.		
Geliloth...:.....	1	30″ x 52″	24″	4″	36″	800	$...................
Gelions.........	2	30″ x 70″	24″	4″	36″	1000	$...... .. ..



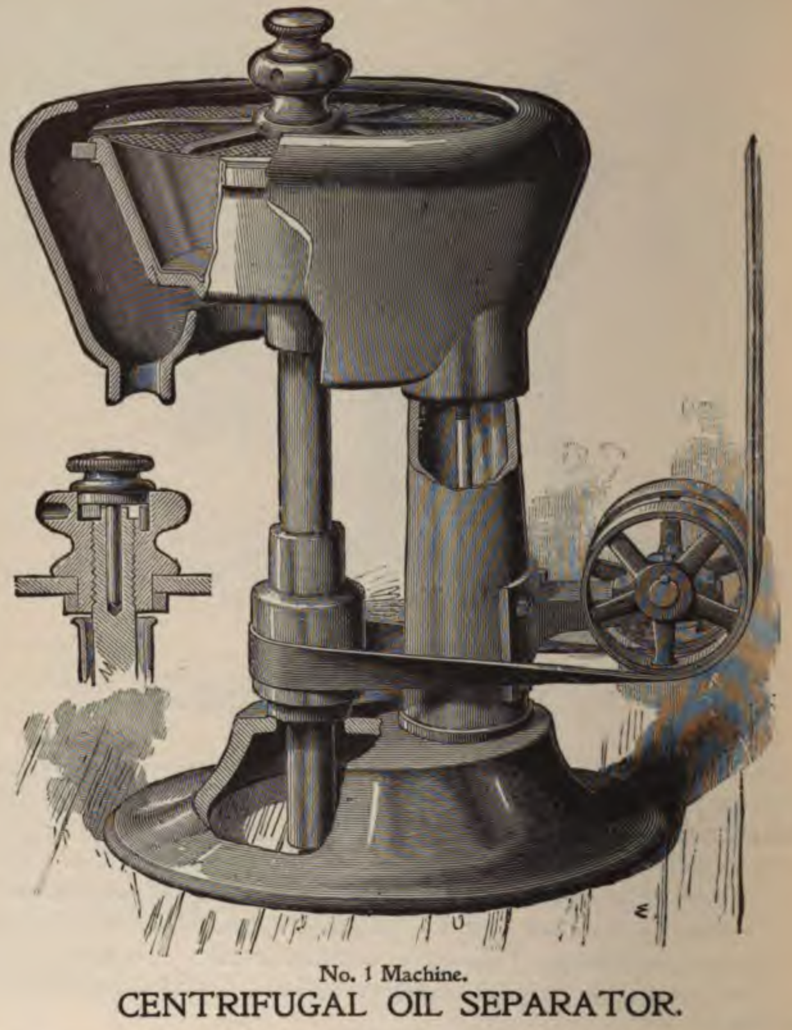
HAND REAMING MACHINE.

The cut on this page represents a device for holding work to be either reamed or tapped out by hand, and will be found a very useful machine to have in a shop. It can be set in any convenient place, and bolted to the floor.

The machine will hold work from 20 inches down to 1¼ inches in diameter. There is a hole in the center of the chuck 4 inches in diameter, so the reamer will go through the chuck, and can be taken out of the side of stand. The jaws of the chuck are extra large and strong, and are made of steel castings. The screws are also made of steel. The workmanship is first-class in every respect. We also make a machine to hold work from 30 inches down to 3 inches in diameter.

SPECIFICATIONS.

Code Word.	Number.	Weight.	Price.
Gellert..................	1	175 lbs.	$..............................
Gellius..........................	2	390 lbs.	$..............................



No. 1 Machine.

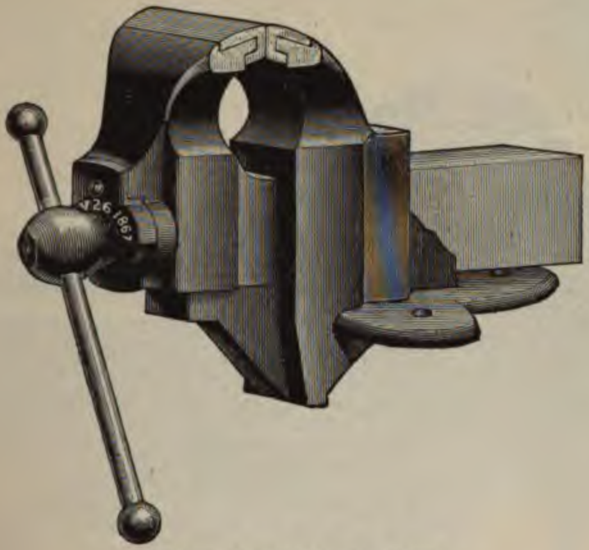
CENTRIFUGAL OIL SEPARATOR.

The machine shown above is designed to meet the requirements of manufacturers using three barrels or more of oil per year, and will thoroughly and quickly remove all the oil from chips and small articles like bolts, nuts and screws. The No. 2 machine is especially designed for use on light chips and punchings made in manufacturing bicycles.

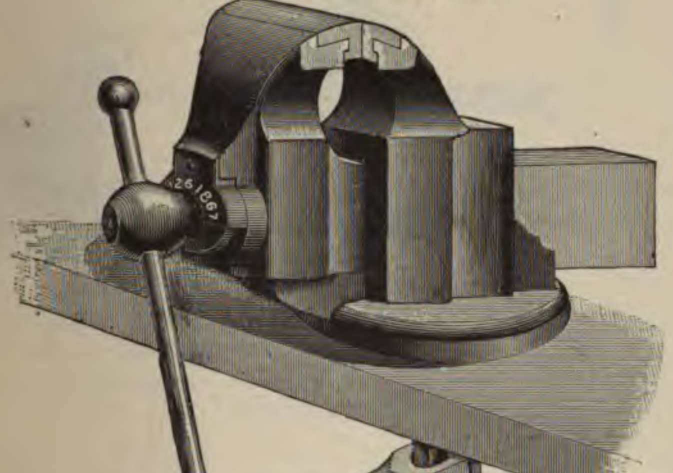
The No. 1 machine has a capacity of about 500 pounds turnings per day.

SPECIFICATIONS.

Code Word.	No.	Diam. of Pan.		Depth of Pan.	Countershaft Pulleys.			Weight.	Price.
		Top.	Bottom.		Diam.	Face.	Revs.		
Gelockt	1	15″	10″	5″	6″	3″	565	330 lbs.	$........ ......
Gelodert	2	22″	15″	10″	12″	4″	625	625 lbs.	$........ ...



PATENT PARALLEL VISES.



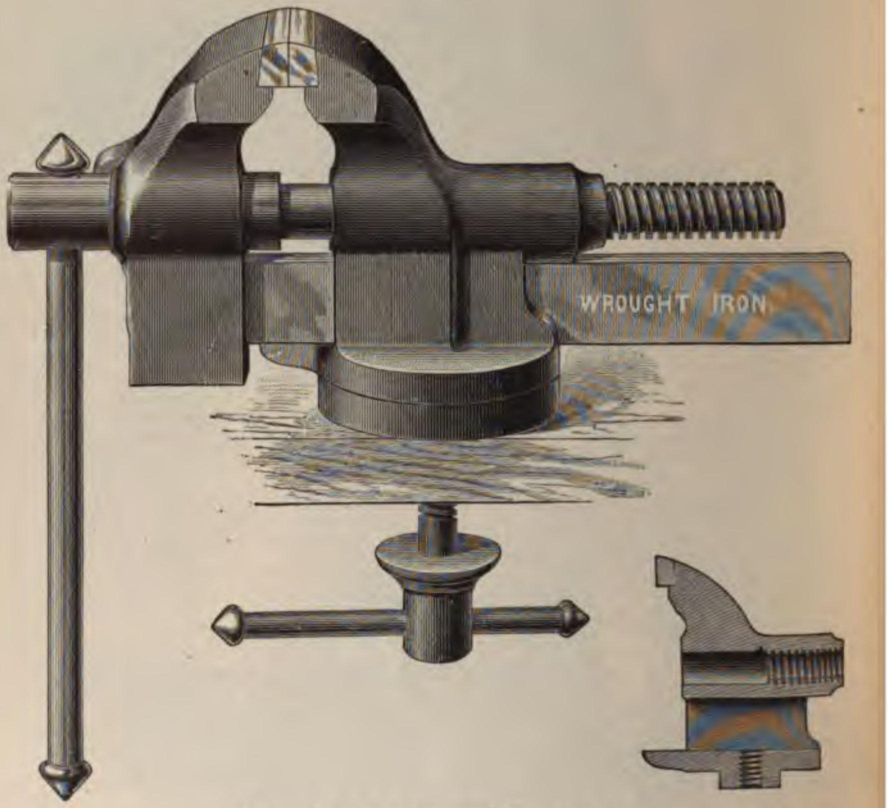
PATENT SWIVEL FILERS' VISE.

With swivel jaw giving instant adjustment to wedge-shaped pieces.

A large variety of vises can be supplied to meet every demand. For heavy work we ecommend the vises shown on the next page. They are well built, very substantial and mbody the latest improvements in this class of vises.

Code word, Patent Parallel Vise, Gelonos.

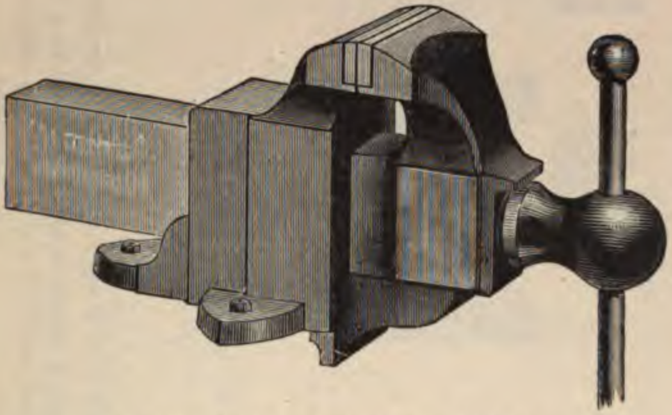
Code word, Patent Swivel Filers' Vise, Gelontis.



HEAVY CHIPPING VISE.

SPECIFICATIONS.

Code Word.	Width of Jaw.	Opens.	Size of Wrought Bar.	Diam. of Screw.	Weight.	Price.
Gelosia.........	4″	8″	2¼ x 1¼″	1⅛″	63 lbs.	$11.00
Gelsomino ..	5″	9″	2¼ x 1¼″	1⅜″	80 lbs.	$13.00
Geltchen.......	6½″	10″	2½ x 1½″	1⅝″	125 lbs.	$17.00
Getstag.........	8″	12″	3 x 1½″	1⅝″	165 lbs.	$22.00



HEAVY CHIPPING VISE.

This is the largest and heaviest vise in the market, and possesses all the requisites to meet the heavy demands made upon a vise of this class in railroad and machine shops, foundries, glass works, mills and large manufactories

8½ inch jaws, open 12 inches, weight, 275 pounds. Price, $ ....

Swivel bottom attachment for this vise, $ ....

Code word, vise without swivel bottom attachment, Gelullt.

Code word, vise with swivel bottom attachment, Gelust.

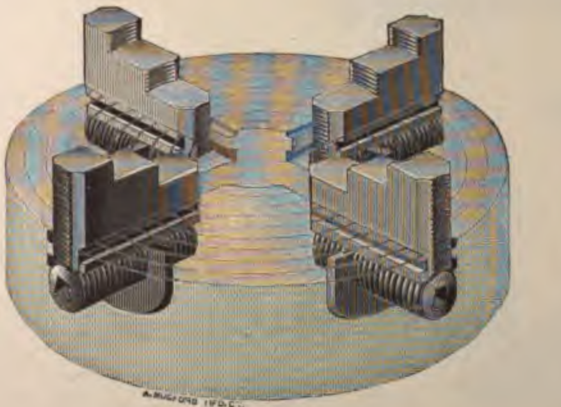


Fig. 1.

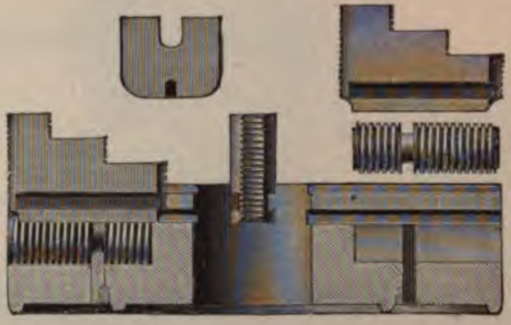


Fig. 2.

NEW INDEPENDENT JAW CHUCKS

WITH REVERSIBLE JAWS.

Figure 2 illustrates the mechanism of the chuck shown by Figure 1. It will be seen that the screws which are of large diameter, are held in place by a hardened steel U shaped plate. As the screw threads extend fully to the outside of the chuck the jaws have greater traverse than is usually found in other styles of independent chucks. The jaws can be very easily removed, and, if through the lack of oil or any other cause the jaw and screw become stuck together, they can be removed from the chuck and separated without injury. The ease with which the jaws can be reversed is a feature of great convenience.

NEW INDEPENDENT JAW CHUCKS.

SPECIFICATIONS.

Code Words.		Size.	Will Hold.	Diameter of Chuck Body.	Diam. of Hole Through Center.	Diam. of Recess For Face Plate.	Approx. Weight, Pounds. (4 Jaw.)	Prices.	
3 Jaws.	4 Jaws.							3 Jaws.	4 Jaws.
Gemeos.....	Gemirias.	6″	7½″	6″	1⅝	3 25/32″	14	$16.50	$ 18.00
Gemeranno........	Gemiront....	7½″	9¼″	7½″	2⅛″	4⅝″	18	18.00	20.00
Gemeresti..........	Gemiscet..	9″	11¼″	9″	2 5/16″	4 29/32″	38	21.00	24.00
	Gemitivo	10″	12¾″	10″	2 5/16″	4 29/32″	46	....	26.00
Gemetzel	Gemmabit	12″	14½″	12″	2 15/16″	6 5/16″	60	27.50	30.00
	Gemmacao...	14″	16½″	14″	2 15/16″	6 5/16″	80	.. ..	34.00
Gemevate.........	Gemmaio..	15″	18″	15″	3⅛″	7″	98	31.00	35.00
	Gemmante	16″	19″	16″	3⅛″	7″	114	....	38.00
Gemidora	Gemmary .	18″	21″	18″	3⅞″	8 5/16″	130	38.00	44.00
	Gemmels	2 ″	23″	20″	3⅞″	8 5/16″	148	....	50.00
Geminal......	Gemmeous.........	21″	24″	21″	3⅞″	8 5/16″	160	48.00	55.00
	Gemmeur...........	22″	25″	22″	3⅞″	8 5/16″	175	....	57.00
Geminous.....	Gemmosis	24″	27″	24″	3⅞″	8 5/16″	194	56.00	65.00
	Gemmoso	26″	29″	26″	4⅜″	9 13/16″	230	....	75.00
	Gemmule...........	28″	31″	28″	4⅜″	9 13/16″	280	....	100.00
	Gemmulis..........	30″	34″	30″	6	13½″	335	....	120.00
	Gemokerd...	32″	36″	32″	6	13½″	400	....	150.00

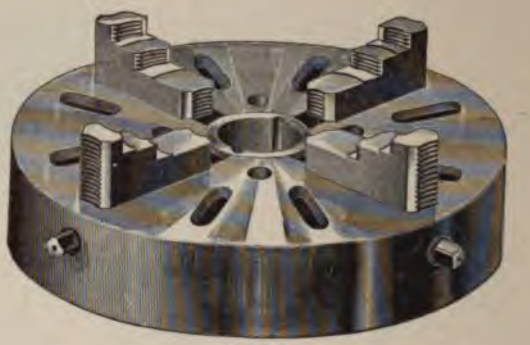


Fig. 3.

INDEPENDENT LATHE CHUCK.

Fig 3. is a front view of the 12-inch size. All sizes have slots in the body as here represented, which are a great convenience when parties desire to bolt work to the chuck.

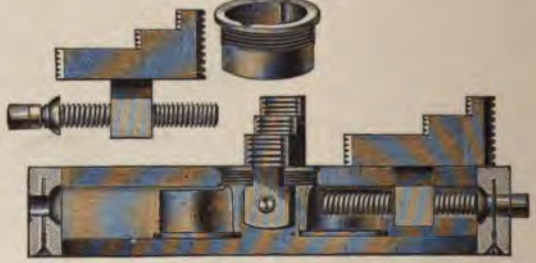


Fig. 4.

Fig 4 shows a section of the 12-inch Independent Lathe Chuck, the center hub removed, also one of the jaws and jaw screws removed with jaw reversed. It also shows the small screw pins which hold the jaw screws in place when the center hub is removed for reversing the jaws. These screw pins may be quickly removed, affording an excellent opportunity for oiling the long bearing of the jaw screws. Attention is called to the reversible jaw with solid nut, and to the heavy ways in which the jaws work.

PRICE LIST OF

FOUR JAW INDEPENDENT LATHE CHUCKS.

WITH REVERSIBLE JAWS.

SPECIFICATIONS.

Code Word.	Size.	Diameter of Chuck Body.	Diam. of Hole Through Center.	Diam. of Recess for Face Plate.	Price.
Gemuit.........	4	4 9/16″	¾″	2¾″	$ 14.00
Gemulos.......	6	6 7/16″	1¼″	4″	18.00
Gemulum......	8	8″	1½″	4″	22.00
Gemunkel.....	10	10″	1¾″	4¾″	26.00
Gemurre.......	12	12⅜″	2″	6″	30.00
Gemursis.....	14	14″	2⅜″	7″	34.00
Gemzen........	16	16″	2¾″	7¾″	38.00
Genaast........	18	18″	3″	8″	44.00
Genageld......	20	20″	3″	10″	50.00
Genannt.......	22	22″	3″	12″	57.00
Genappe.......	24	24″	3″	12″	65.00
Genarque	26	26″	3″	13″	80.00
Genarum......	28	28″	3″	14″	100.00
Genascht......	30	30″	3¼″	15″	120.00
Genasses.. ..	36	36″	3¼″	18″	210.00
Genau..........	42	36″	3¼″	18″	240.00

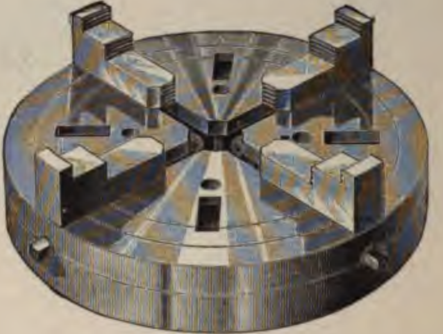
PRICE LIST OF

FOUR JAW INDEPENDENT LATHE CHUCK.

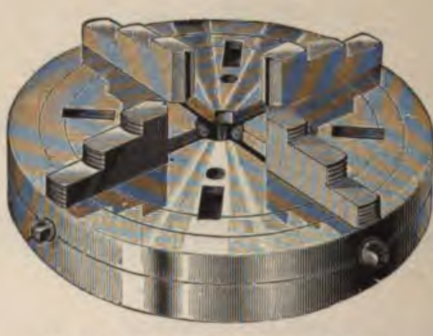
HEAVY PATTERN, WITH PATENT REVERSIBLE JAWS.

SPECIFICATIONS.

Code Word.	Size.	Diameter of Chuck Body.	Diam. of Hole Through Center.	Diam. of Recess for Face Plate.	Price.
Ger ive... ...	10	10″	1¼″	4¾″	$26.00
Gendarme....	12	12″	2″	6″	30.00
Gendrage......	14	14″	2⅜″	7″	34.00
Genealog......	16	16″	2¾″	7¾″	38.00
Genearch......	18	18″	3″	8″	44.00
Genebra.......	20	20″	3″	10″	50.00
Genehm.......	22	22″	3″	12″	57.00
Geneigt.......	24	24″	3″	12″	65.00



UNIVERSAL LATHE CHUCK.
COMMON JAW.



UNIVERSAL LATHE CHUCK.
REVERSE JAW.

These chucks can be furnished with either three or four jaws.

UNIVERSAL LATHE CHUCKS.

Code Words.		Size.	Will Hold.	Diam. Including Projecting Pinion Head.	Diam. Hole Through Center.	Diam. Recess for Face Plate.	Weight.		Price.	
3 Jaw.	4 Jaw.						3 Jaw.	4 Jaw.	3 Jaw.	4 Jaw.
Genero.	....	3"	3½"	4¼"	¾"	1 15/16"			$ 18.00	
Generons......	Gengiva........	4"	4½"	5¼"	15/16"	2⅝"	7 lbs.	7½ lbs.	22.00	$ 26.00
Genesial	Genialer.	6"	6½"	7⅞"	1¼"	3 11/16"	14 lbs.	15 lbs.	25.00	30.00
Genesio..	Genially.	9"	9⅜"	10 15/16"	1½"	5 1/32"	15 lbs.	16 lbs.	26.00	32.00
Genesung......	Geniazo	12"	12½"	13⅜"	1⅝"	6⅜"	30½ lbs.	32½ lbs.	34.00	42.00
Genetkat	Genick	15"	15¾"	16⅜"	2"	7 1/16"	47 lbs.	51 lbs.	44.00	56.00
Genetzt..	Genicoli........	18"	18¾"	18¼"	2⅜"	8"	66 lbs.	74 lbs.	52.00	64.00
Geneutel.......	Genicule.....	21"	21¾"	20⅝"	2¾"	9 21/32"	82½ lbs.	90 lbs.	62.00	75.00
Genevan	Geniepig	24"	25"	22½"	2¾"	10"	111 lbs.	120 lbs.	80.00	95.00
Genevese	Genieux........	27"	27"	26½"	3¼"	12"	131½ lbs.	144 lbs.	100.00	120.00
Genevois	Genimen	30"	31½"	31"	3½"	16 1/16"	290 lbs.	297 lbs.	170.00	200.00
Gengeli.........	Genimina	36"	37"	36⅝"	4"	17¾"	390 lbs.	400 lbs.	230.00	285.00

Either the common or reverse jaw will be furnished, as desired.

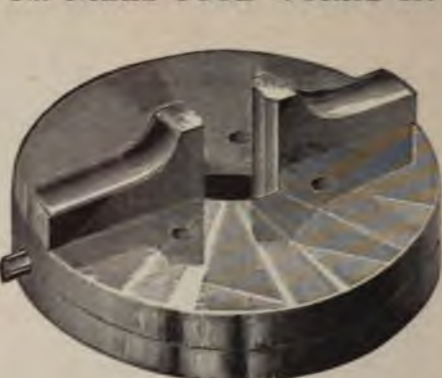


Fig. 19.

TWO JAW CHUCK, STYLE F.

This cut represents a universal chuck with two jaws. The jaws are finished as shown in cut, usually, but can be turned on any desired circle, or have a V slot on the bite. There is a large hole through the center of the chuck, and the jaws have a long bearing on the work. This chuck is used largely by brass workers.

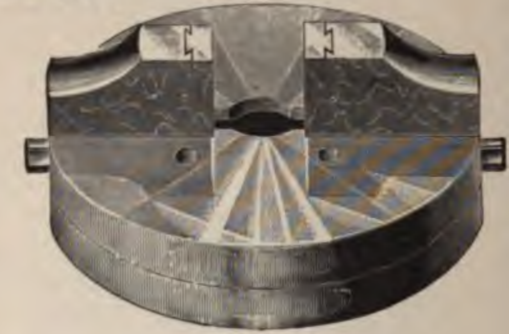


Fig. 20.

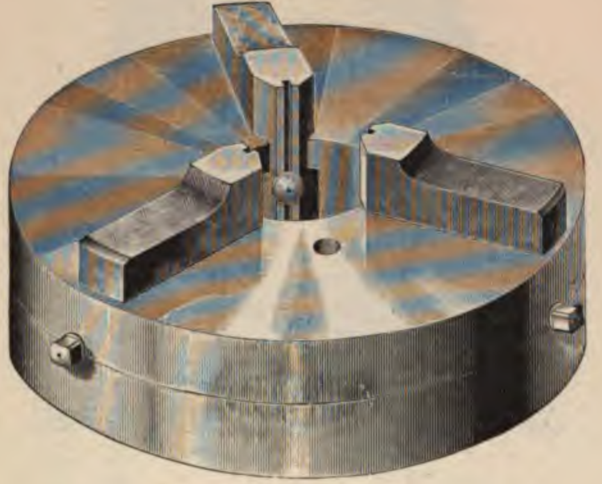
TWO JAW CHUCK, STYLE G.

This cut represents a two jaw universal chuck, with slip jaws dove-tailed on to the bite of jaws. We can supply any number of extra slip jaws desired, of cast iron or machinery steel.

We can also furnish these style jaws in an independent jaw chuck, or in a combination chuck.

SPECIFICATIONS.

Style F.				Style G.			
Code Word.		Size Chuck.	Price.	Code Word.		Price.	Extra Slip Jaws, Per Set.
Universal.	Independent.			Universal.	Independent.		
Halfacht.......	Halfslag.	4″	$20.00	Halsweh.	Haltort	$22.00	$1.75
Halfbad.........	Halftern.........	5″	21.00	Halswond.....	Haltritt.........	23.00	1.75
Halfdek.......	Halftwee......	6″	22.00	Halszeel.......	Haltseil......	24.00	2.00
Halfdrie	Halfvier	8″	28.00	Haltbar........	Haltstelle....	30.00	3.00
Halfest	Halfzes.........	9″	30.00	Halterio........	Haltung......	32.00	3.00
Halfgod.... ...	Halfzuil........	12″	40.00	Haltica..........	Halurgie	42.00	3.50
Halfman.......	Halhul.........	15″	48.00	Haltlos..	Halvans	50.00	4.00
Halfness.......	Halictus	18″	56 00				
Halfpint.......	Halique.......	21″	74.00				
lfpond......	Halladas.......	24″	92.00				

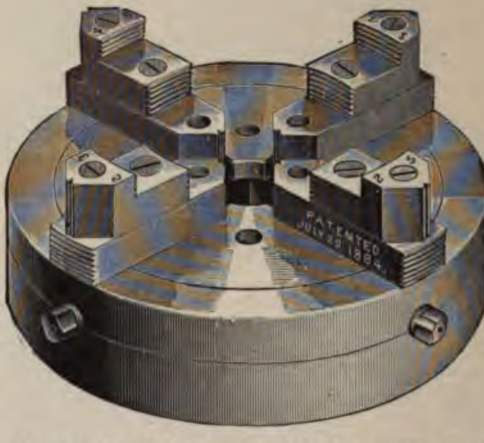


HEAVY PATTERN CUTTING-OFF CHUCK, STYLE E.

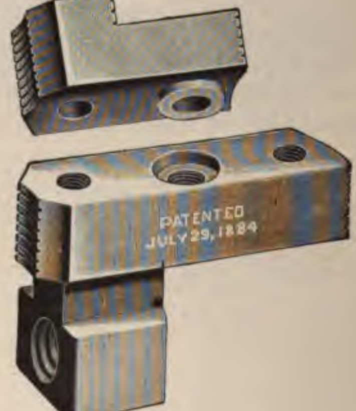
This cut represents a heavy pattern universal lathe chuck, designed for use on cutting-off machines. It is made extra heavy in every part, and we recommend it for the work for which it was designed as the best chuck made. We make a variety of sizes, both three and four jaw and carry them in stock.

SPECIFICATIONS.

Code Word.		Size.	Diameter of Center Hole.	Diameter of F. P. Seat.	Price.	
3 Jaw.	4 Jaw.				3 Jaw.	4 Jaw.
Hamarum.....	Hambrear. ...	8″	1⅜″	4½″	$30.00	$38.00
Hamastris....	Hambrege. ...	9″	2⅛″	5″	34.00	42.00
Hamatos	Hambutte. ..	12″	3⅛″	7¼″	44.00	56.00
Hamaux.......	Hamearis	14″	4⅛″	8 17/32″	56 00	64 00
Hamaxa.	Hamecon.....	17″	5⅛″	11″	62.00	75.00
Hambelien ...	Hamelvet,....	20″	6¼″	12″	80.00	95.00



COMBINATION LATHE CHUCKS.

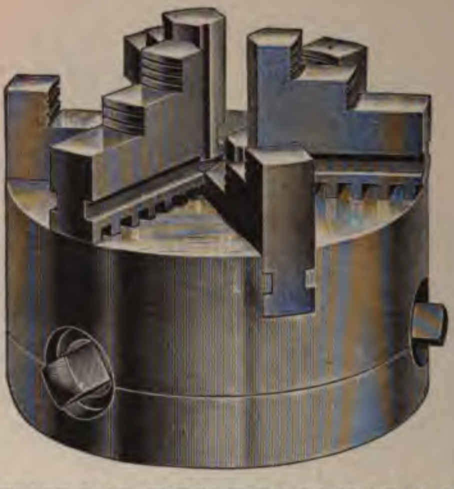


Above we show a reversible jaw chuck, also the patent reversible jaw, separated, showing dowel on the under side of upper section and recess in lower section.

COMBINATION LATHE CHUCKS.

REVERSIBLE JAWS, No. 21.

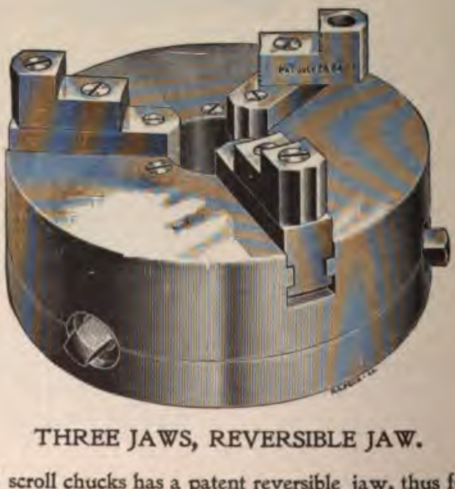
Code Words.		Size.	Will Hold.	Dia. Including Projecting Pinion Head.	Dia. Hole Through Center.	Dia. Recess for Face Plate.	Weight.		Price.	
3 Jaws.	4 Jaws.						3 Jaws.	4 Jaws.	3 Jaws.	4 Jaws.
Hancornie	Handful	6″	6½″	7⅞″	1¼″	$3\frac{11}{16}$″	15 lbs.	16 lbs.	$ 26.00	$ 32.00
Handbahre ...	Handgarn....	9″	9⅜″	$10\frac{15}{16}$″	1½″	$5\frac{1}{32}$″	30½ lbs.	32½ lbs.	34.00	42.00
Handblatt....	Handgeld....	12″	12½″	13⅜″	1⅝″	6⅜″	47 lbs.	51 lbs.	44.00	56.00
Handblow	Handgicht....	15″	15¼″	16⅛″	2″	$7\frac{1}{16}$″	66 lbs.	74 lbs.	52.00	64 00
Handboog	Handgriff.....	18″	18⅝″	18¼″	2⅜″	8″	82½ lbs.	90 lbs.	62.00	75 00
Handbuch ...	Handgrith....	21″	22½″	20⅝″	2¾″	$9\frac{21}{32}$″	111 lbs.	120 lbs.	80.00	95.00
Handdruck ..	Handhaben ..	24″	24½″	22½″	2¾″	10″	131½ lbs.	144 lbs.	100.00	120.00
Handelst......	Handhoch...	27″	27″	26½″	3¼″	12″	200 lbs.	206 lbs.	135.00	160.co
Handelten. ..	Handicap	30″	31½″	31″	3½″	$16\frac{1}{16}$″	290 lbs.	297 lbs.	170.00	200.00
Handeuvel....	Handily	36″	37″	36⅝″	4″	17¾″	390 lbs.	400 lbs.	230.00	285.00
Handfrohn ..	Handiness..	42″							270.00	325.00



THREE JAW, WITH TWO SETS OF JAWS.

GEARED SCROLL CHUCKS.

Above we show a cut of a three-jaw geared scroll chuck, with two sets of jaws. For all the uses to which these chucks can be put, both inside and outside jaws can be used to advantage, and this chuck, with two sets of solid jaws, will be found capable of sustaining the heaviest strains.



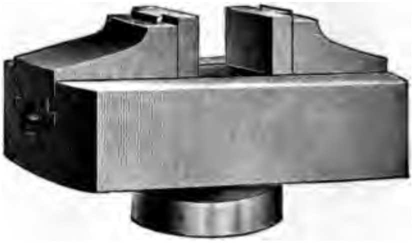
THREE JAWS, REVERSIBLE JAW.

This line of geared scroll chucks has a patent reversible jaw, thus furnishing a chuck with one set of jaws that will answer every purpose, at the same time avoiding the necessity and expense of two sets of jaws.

GEARED SCROLL CHUCKS.

SPECIFICATIONS.

CODE WORDS.									PRICE.			
3 Jaws. One set of Jaws.	3 Jaws. Two Sets of Jaws.	3 Jaws. Reversible.	4 Jaws. One Set of Jaws.	4 Jaws. Two Sets of Jaws.	4 Jaws. Reversible.	Size.	Diam. Hole in Centre.	Diam. Face Plate Recess	One set of either 3 common or 3 reversible jaws.	Two sets of 3 common jaws each.	One set of either 4 common or 4 reversible jaws.	Two sets of 4 common jaws each.
Handjar.......	Handloom	Handpalm ...				2½"	⅝"		$ 7.50	$ 9.00		
Handjeri.......	Handlung.....	Handpers. ...	Handross......	Handsel..	Handstufe	3"	⅝"	2⅜"	10.00	12.00	$11.00	$13.60
Handjevol....	Handmagd ...	Handpfahl ...	Handruthe ..	Handshoe. ...	Handtasche..	4"	¾"	3 1/16"	12 00	14.40	13 20	16 40
Handkauf.....	Handmaiden	Handpferd. .	Handsack.....	Handsiegel...	Handteller ...	5"	⅞"	3¾"	15.00	18.00	16.50	20.50
Handkette....	Handmandel	Handpomp ..	Handsaege ...	Handsome ...	Handtight....	6"	1 3/16"	4¾"	18.00	21.60	19.80	24.60
Handkorb. ...	Handmesser.	Handpresse .	Handsalbe ...	Handspaak ..	Handtrom ...	7½"	2"	4¾"	20.00	24.00	22.00	27.30
Handkuss. ..	Handmolen ..	Handpumpe .	Handschlag.	andspring..	Handtrouw..	9"	2½"	5¾"	24.00	28.80	26.40	32.80
Handlinie. ...	Handmuff.....	Handrail	Handschuh .	Handstaves ..	Handvat.	12"	3"	7"	30.00	36.00	33 00	41.00
Handlohn. ...	Handpaard	Handrolle. ...	Handseife..	Handstroke .	Handvest......	15"	3¼"	8"	40 00	48.00	44.00	54.60



No. 26.

TWO-JAWED BOX BODY CHUCK.

WITH SLIP JAWS.

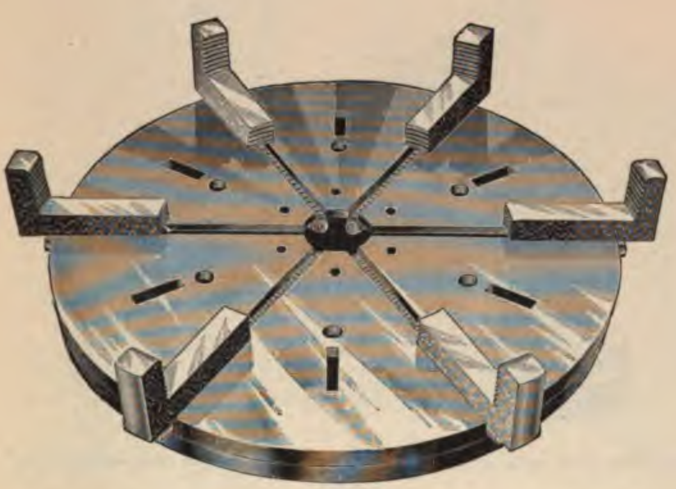
SPECIFICATIONS.

Size.	Jaws Take.	Prices and Code Words.	Extra Slip Jaws. Prices and Code Words.	
			Iron, Per Pair.	Cast Steel, Per Pair.
7″	3″	$24.00 Hamilla	$1.00 Hammevet	$2.00 Hamza
9″	4″	30.00 Hamkin	1.25 Hammon	3.00 Hanani
12″	6″	36.00 Hammath	1.25 Hamula	4.00 Hanapes
15″	8″	42.00 Hammered	1.50 Hamum	5.00 Hanche

If desired, we can furnish special slip jaws formed to hold any irregular piece of work, at small advance in cost.

The code words are for universal jaws.

We can furnish independent jaws when desired without extra charge.



IMPROVED SIX-JAW CAR WHEEL CHUCK.

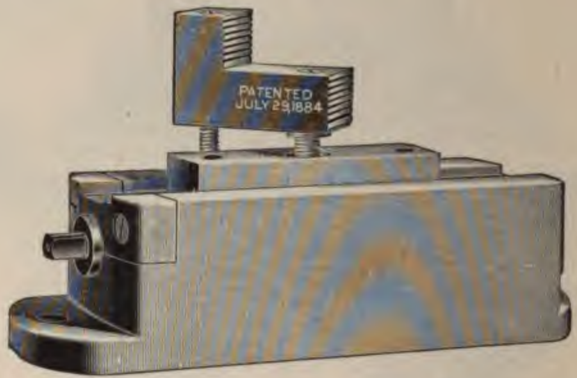
These car wheel chucks can be attached to a boring machine table or lathe, and are very useful for general machine work.

Car wheel chucks with six and eight jaws can be supplied as desired. Special prices furnished on application.

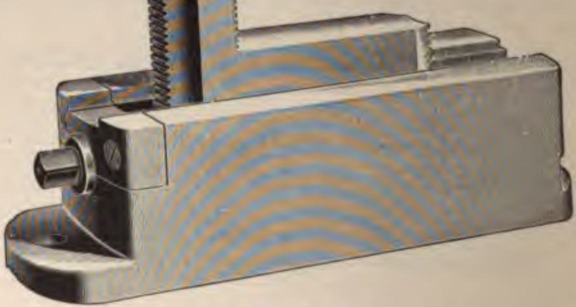
PRICE LIST OF UNIVERSAL CAR WHEEL CHUCKS.

Code Word.	Diameter.	Price.
Hanebalk...........	30″ Car Wheel Chucks, three-Jaw	$185.00
Hanekam........ ...	36″ " " " "	250.00
Hanekop............	42″ " " " "	300.00
Hanefoot..	42″ " " " six-Jaw No. 25	400.00

REVERSIBLE FACE-PLATE JAWS.



Face-Plate Jaw, with Reversible Jaw, showing method of reversing jaw.



Face-Plate Jaw, showing solid jaw.

NEW FACE PLATE JAWS.

The general success which the patent reversible jaw has met in the market during the past few years, has led to its adoption for this new face-plate jaw, thus putting it on an equal footing with this well-known line of lathe chucks. As shown in cut, the jaw can be reversed by simply loosening the screws and revolving the top, reversing the jaw in half the time required by any other reversible jaw.

When desired, we also furnish with solid jaw.

We can furnish them in three sizes, as per list below. They are made strongly and compactly.

We furnish two bolts with each jaw, and a steel key with each set.

SPECIFICATIONS.

Code Words.		Code Words.		Size.	Price per Set of Three, with either Solid or Reversible Jaws.	Price per Set of Four with either Solid or Reversible Jaws.
One Set of 3 Solid Jaws.	One Set of 3 Reversible Jaws.	One Set of 4 Solid Jaws.	One Set of 4 Reversible Jaws.			
Hanglip	Hangstoel.....	Hangwite	Hankles	8″	$45.00	$ 60.00
Hangriem.....	Hanguane	Hanipou	Hannai	10″	60.00	80.00
Hangslot	Hangwang ...	Hankered	Hannelar	12″	90.00	120.00

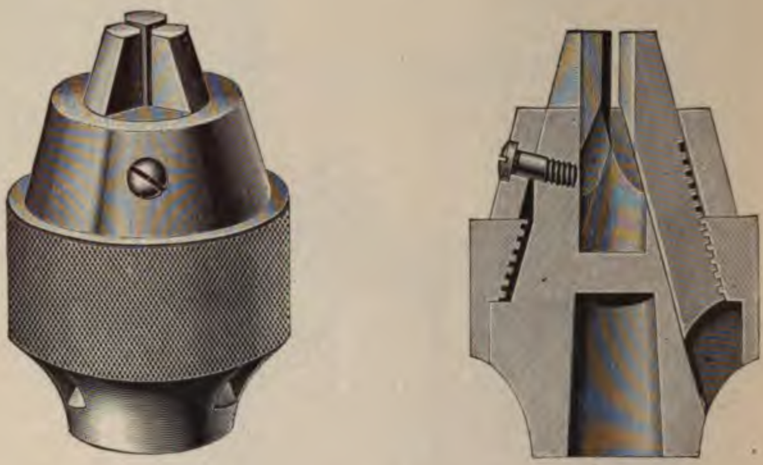


Fig. 1. Fig. 2.

"NEW MODEL" DRILL CHUCK.

This chuck is especially adapted for all light and rapid drilling, such as is done on "sensitive" drills and hand lathes, and where accuracy is required. The chuck is made entirely of steel, and of such grades as is best adapted to the different parts, all of which are carefully constructed by skilled workmen with the latest improved tools and machinery.

Fig. 1 represents the form of the chuck with all the parts complete; and Fig. 2 the construction and arrangement of parts.

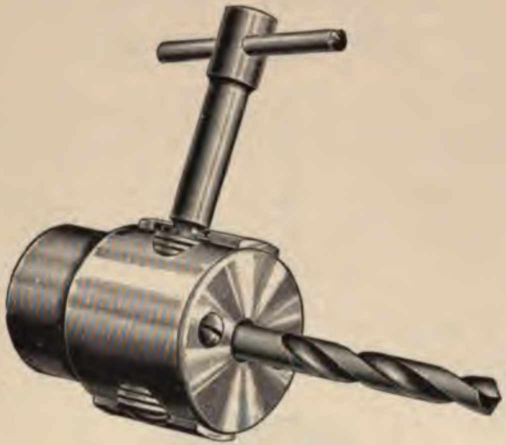
By revolving the knurled nut the jaws are moved outward or inward in the converging slots in the chuck body as may be desired. The chuck can be operated by hand, and when a very firm grip is desired it may be obtained by the use of a spanner wrench, one being furnished with each chuck. The chuck may be taken apart readily for cleaning and oiling by removing the nut enough to disengage the jaws. In putting the chuck together it is necessary to notice that the number on the jaws corresponds with the number of the slot in the chuck body.

Each chuck is ground true after the jaws are hardened.

A hole the full capacity of the chuck may be drilled through the center without injury to the chuck.

PRICE LIST.

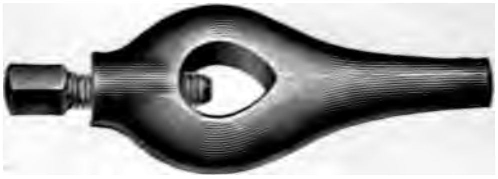
Code Word.	Order by These Numbers.	Capacity.	Price, each.
Hansart..........	11	o to $\frac{7}{32}$''	$5.50
Hanska....................	12	o to $\frac{11}{32}$''	5.50
Hanssop	13	o to $\frac{15}{32}$''	9.00



THE UNION DRILL CHUCK.

SPECIFICATIONS.

Code Word.	Number.	Diameter.	Holding.	Price.
Hapering..........	000	1¼″	0 to ¼″	$ 7.00
Hapern..............	00	1⅝″	0 to ⅜″	7.50
Haplaire............	100	2¼″	0 to ½″	8.00
Haplessly	101	2¾″	0 to ¾″	9.00
Haplope	102	3⅛″	0 to 1″	10.00



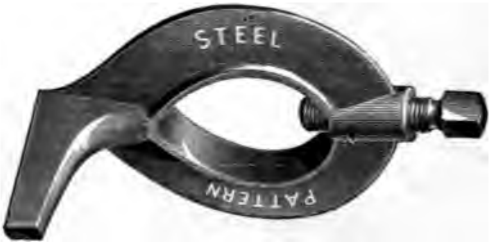
STRAIGHT TAIL DOG,

WITH STEEL SCREWS.

No.	Inch.	Price.	No.	Inch.	Price.
1	¾	$ .60	11	2½	$ 1.45
2	⅞	.70	12	3	1.60
3	1	.70	13	3½	1.80
4	1⅛	.80	14	4	2.10
5	1¼	.80	15	4½	2.75
6	1⅜	.95	16	5	3.25
7	1½	.95	17	5½	4.00
8	1¾	1.10	18	6	5.00
9	2	1.20	19	7	6.00
10	2¼	1 35	20	8	7.00

One set to 2-inch........................$ 7.80
Full set......................................44.10

Code Word, one set to 2-inch, Harmoge.
Code Word, full set, Harmoste



LIGHT STEEL DOG

With Steel Screws. U. S. Standard. Points Hardened.

No.	Inch.	Price
1	⅜	$ .35
2	½	.35
3	¾	.50
4	1	.60
5	1¼	.75
6	1½	.85
7	1¾	1.00
8	2	1.10

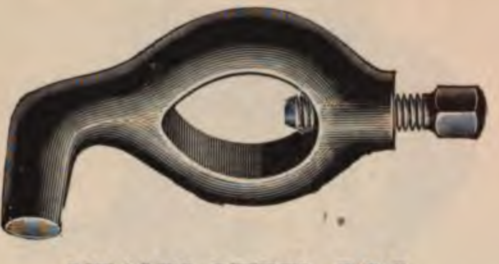
Small Set of 8........................$5.50

Code Word, for small set, Harmvoll

No.	Inch.	Price
9	2½	1.40
10	3	1.50
11	3½	1.70
12	4	1.90

Full set of 12........................$12.00

Code Word, for full set, Harnacher.



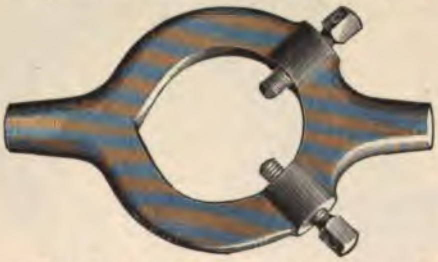
HEAVY STEEL DOG,

With steel screws. U. S. standard and the points hardened.

This dog has a very heavy boss, so that if the thread wears, a heavier screw can be substituted.

No.	Inch.	Price.	No.	Inch.	Price.
1	⅜	$ .40	13	2¼	$ 1.35
2	½	.50	14	2½	1.45
3	⅝	.60	15	3	1.60
4	¾	.60	16	3½	1.80
5	⅞	.70	17	4	2.10
6	1	.70	18	4½	2.75
7	1⅛	.80	19	5	3.25
8	1¼	.80	20 (extra)	5½	4.00
9	1⅜	.95	21 "	6	5 00
10	1½	.95	22 "	7	6.00
11	1¾	1.10	23 "	8	7.00
12	2	1.20			

Code Word.		
Harneros,	One small set of 8, by ¼ in. to 2 in.	6.25
Harnisch,	One set of 12, by ¼ to 2 in. continued by ½ to 4 in..	13.20
Harnruhr,	Full set of 19, by ⅛ to 1½ in. continued by ¼ to 2½ in. and ½ to 5 in.	23 60

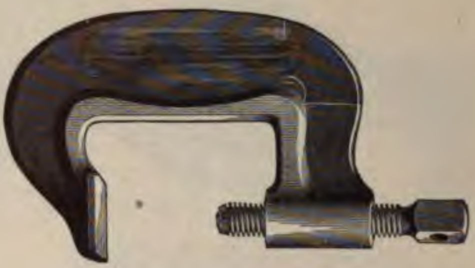


"DOUBLE TAIL" LATHE DOG.

The heavy work required by modern methods, calls for a stronger driving device than that formerly used, and to meet this demand this very heavy dog has been designed. The body is extra strong, and two large screws are used—thus securing a double hold on the work—while being driven from two points the twisting strain of the bent tail dog is avoided and its efficiency increased accordingly.

Size	Price	Size	Price
6 inch	$12.00	10 inch	$19.50
7 "	13.50	11 "	26 00
8 "	14 50	12 "	28.00
9 "	17.00		

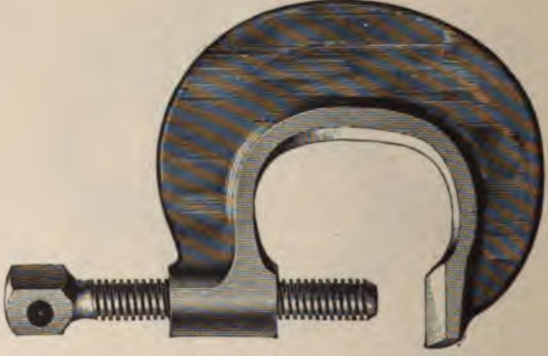
Code Word for Type, Harnstoff.



MECHANICS' CLAMP.

The back is 1½ inches from center to center.

No. 1, opens 2 inches	$1.25
No. 2, " 3 "	1.50
No. 3, " 4 "	1.75
No. 4, " 5 "	2.00
No. 5, " 6 "	2.25
No. 6, " 7 "	2.50
No. 7, " 8 "	2.75
No. 8, " 9 "	3.00
Code Word, Full set, Harong.	$17.00

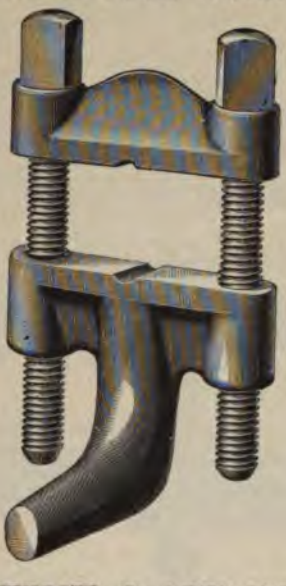


FITTERS' CLAMP.

MADE OF STEEL. VERY STRONG.

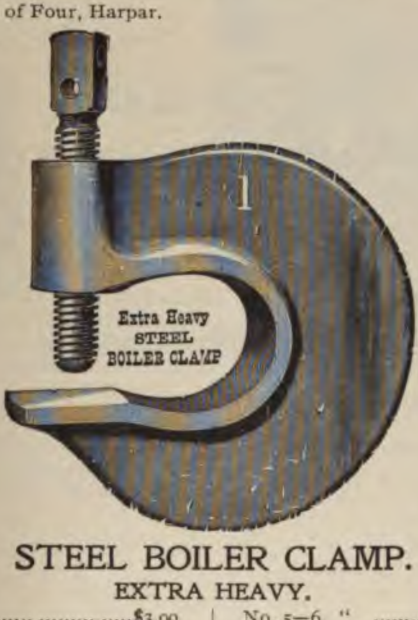
Has a square thread steel screw with hardened point running down to the foot. The foot is planed square by the screw.

No. 1, opens 1⅓ inches, runs back 1⅛ inches	$1.25
No. 2, " 1¾ " " 1¾ "	1.50
No. 3, " 2½ " " 2⅓ "	1 75
Code Word, Full set, Harpaga.	4.50



PATENT CLAMP DOG.

No. 1, opens 1 inch	$1.00
No. 2, " 1½ "	1.10
No. 3, " 2 "	1.30
No. 4, " 3 "	1.60
Code Word, Sets of Four, Harpar.	5.00

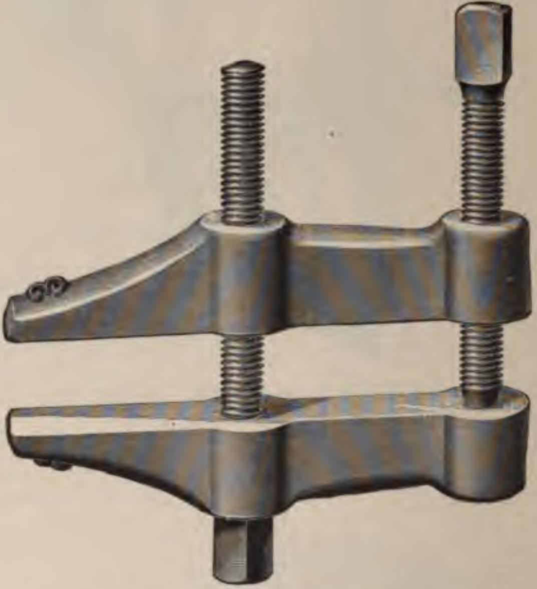


STEEL BOILER CLAMP.

EXTRA HEAVY.

No. 1—2 inch	$3.00
No. 2—3 "	4.00
No. 3—4 "	5.00
No. 4—5 "	6.00
No. 5—6 "	$ 7.50
No. 6—8 "	8.50
No. 7—10 "	10.00

Code Word for Type, Harpist.



NEW VISE CLAMP.

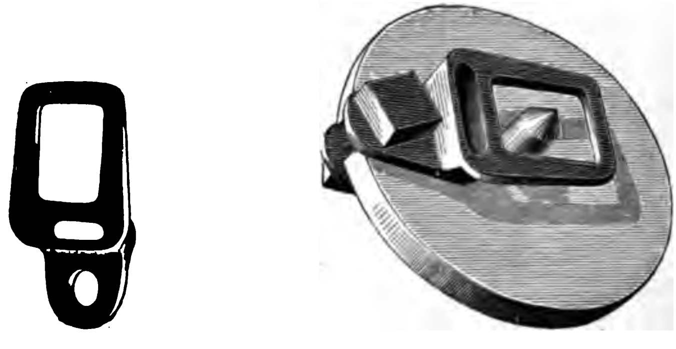
MADE FROM STEEL CASTINGS.

No. 1, opening to 1¼ inch	$ 1.25
No. 2, " " 2¼ "	1.50
No. 3, " " 3¼ "	2.00
No. 4, " " 4¼ "	2.50
No. 5, " " 5¼ "	3.25
No. 6, " " 6¼ "	4.00
Code Word, Full Set, Harro.	14.50

STANDARD WRENCHES.

UNSIZED AND ROUGH.

No. 1,	¼	and	5/16	inch	.15
No. 2,	⅜	"	7/16	"	.20
No. 3,	½	"	9/16	"	.30
No. 4.	⅝	"	¼	"	.40
No. 5,	⅞	"	1	"	.60
No. 6,	1⅛	"	1¼	"	.90
No. 7,	1⅜	"	1½	"	1.50
Code Word, Per set, Harsha.					$4.05



PATENT BOLT DOG.

Single dogs, each	$ .25
Sets of 12 sizes, 5/16 to 2 inches, inclusive	1.00

Code Word, Set of 12, Harstoel.

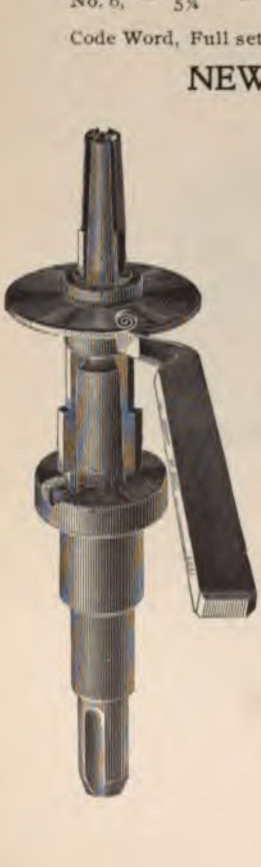
CAST IRON JACK SCREWS.

For use as blocking on Planer, Drill Press, Milling Machine, Boring Mills, &c. This useful little tool is strong, well made and of great convenience in a machine shop.

PRICE LIST.

No. 1,	size	1⅛ inch	to	1½	inch		.45
No 2,	"	1½	"	2	"		.50
No. 3,	"	2	"	2¾	"		.60
No. 4,	"	2⅝	"	3¼	"		.75
No. 5,	"	3¼	"	5¼	"		.95
No. 6,	"	5¼	"	7¼	"		1.50
Code Word, Full set, Harszalf.							$4.75

NEW EXPANDING MANDREL.



AMATEURS' SIZE.

Taking anything from 3/16 to 1 inch inclusive.

Code Word, Hartais. Price $5.00

MACHINISTS' SIZE.

Code Word.	Number.	Size.	Price.
Hartall...........	1	½ to 1″	$10.00
Hartaran..........	2	1 to 1½″	14.00
Hartazgo..........	3	1½ to 2″	18.00
Hartine	4 WITH SCREWS	2 to 3″	32.00
Hartklep	5 WITH SCREWS	3 to 4″	44.00

DIRECTIONS.

To tighten the work, drive with a copper hammer or a piece of soft iron or brass, on the large end, not too hard; to loosen, on small end. You can take a good cut by driving with a one ounce copper or brass hammer, and not drive hard.

This tool is steel, well made, is simple, substantial, cheap and useful.

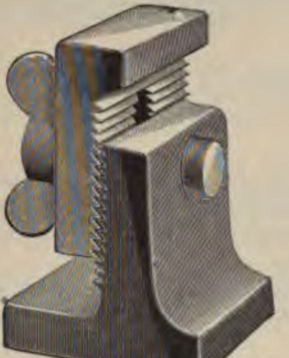
STEEL CHUCK DRILL HOLDERS.

They are of five sizes. The slot is rounded every way so as to avoid corners that inter- with centering the drill.

If a plate is put under the screw in the tool post to prevent bending, they will do good ice.

PRICES.

No. 1.	taking drills from	⅜ to $\frac{9}{16}$	inch	$ .50
No. 2,	" "	$\frac{9}{16}$ to ¾	"	.50
No. 3,	" "	¾ to 1⅛	"	.60
No. 4,	" "	1⅛ to 1⅜	"	.75
No. 5,	" "	1⅜ to 2	"	.90
Code Word, Full set, Hartoor.				$3.25



IMPROVED ADJUSTABLE BLOCKING.

An improved device for use as blocking where work is to be "strapped" to the machine. quickly adjusted to any point within its range. Is strong, firm and well made, and is a t improvement over other devices for this purpose.

No. 1,	size 3 inches	to 4 inches	$2.00
No. 2,	" 4 "	5⅜ "	2.20
No. 3,	" 5⅜ "	7¾ "	2.60
No. 4,	" 7¾ "	11 "	3.50
Code Word, Full set, Hartsin.			$10.30

ALL-WROUGHT STEEL PULLEYS.

These pulleys are pressed from mild sheet steel. They are as light as wood and stronger than iron. Among other points in their favor is their perfect balance, clamp hub and the interchangeable bushing system, by means of which a very small supply of pulleys can be made to fit almost any shaft.

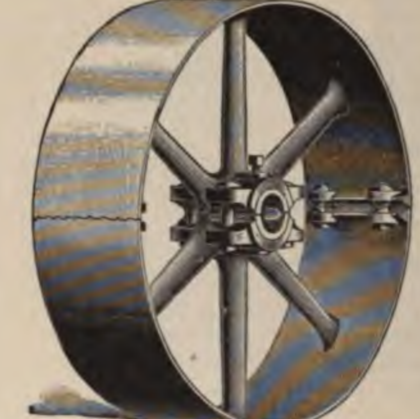
By means of a special code our agents can order any size of pulleys with any bore desired, easily and cheaply. This will, we believe, be greatly appreciated by foreign customers.

PRICE-LIST OF ALL-WROUGHT STEEL SPLIT PULLEYS.

Diameter.	Face in Inches.							
	2"	3"	4"	5"	6"	8"	10"	12"
6"	$3.15	$3.30	$3.45	$ 3.75	$ 4.05	$ 4.70		
7"	3.22	3.38	3.60	3.90	4.20	4.85		
8"	3.30	3.45	3.75	4.05	4.35	4.95	$ 5.60	
9"	3.38	3.60	3.90	4.20	4.50	5.10	5.75	
10"	3.45	3.75	4.05	4.35	4.65	5.25	5.90	$ 6.45
11"	3.65	3.90	4.20	4.50	4.80	5.40	6.00	6.90
12"	3.90	4.20	4.63	4.80	5.33	5.78	6.45	7.65
13"	4.05	4.35	4.80	5.20	5.62	6.43	7.20	8.40
14"	4.20	4.50	5.20	5.65	6.15	7.05	8.03	9.00
15"	4.35	4.65	5.45	5.80	6.55	7.65	8.80	9.75
16"	4.50	4.95	5.75	6.10	6.90	8.25	9.45	10.50
17"		5.25	6.00	6.50	7.28	8.78	10.05	11.25
18"		5.55	6.38	7.00	7.65	9.30	10.65	12.00
19"		5.80	6.75	7.50	8.25	10.13	11.25	12.90
20"		6.00	7.50	8.10	9.00	10.73	12.00	14.25
21"		6.25	8.00	8.90	9.60	11.25	12.98	15.60
22"		6.50	8.55	9.50	10.28	12.00	14.10	16.80
23"		7.00	8.70	9.90	10.58	12.60	14.75	18.00
24"		7.50	8.90	10.00	10.95	13.20	15.68	19.05

Code Word for type, Heido.

Discounts on application.



SPLIT BUSH.

IRON SPLIT PULLEYS

WITH PATENT INTERCHANGEABLE METAL BUSH SYSTEM.

All guaranteed for Double Belt. Furnished without Bushes when made to order.

PRICE LIST OF THE PATENT IRON SPLIT PULLEYS FOR DOUBLE BELT.

Diam. in Inches.	FACE IN INCHES.													
	4	5	6	7	8	9	10	11	12	14	16	18	20	22	24
24	....	....	....	....	....	....	....	....	....	$22 95	$28.30	$31.00	$ 33.75	....	....
25	$10.10	$11.65	$12.50	$14.35	$15.30	$16.25	$17.25	$20.15	$21.30	23 90	29.35	32.15	35.00	$ 42.05	$ 44.95
26	10.50	12.05	13.00	14.85	15.95	16 90	18.00	21.00	22.25	24.90	30.40	33.30	36.30	43.40	46.40
27	10.00	12.55	13 45	15.40	16.50	17.60	18.75	21.85	23.15	25.85	31.45	34.50	37.55	44.70	47.85
28	11.30	12.90	13.90	16.00	17.10	18.30	19.50	22.70	24.10	26.80	32.50	35.65	38.80	46.00	49.25
29	11.70	13.40	14.40	16.55	17.75	19.00	20.30	23.55	24.95	27.80	33.60	36.80	40 40	47 40	50.70
30	11.95	13.85	14 95	17.15	18.40	19.80	21.15	24.40	25.85	28.80	34.70	38.00	41 40	48 80	52.20
31	13.45	15.55	16.70	19.10	20.45	21.85	23.30	27.85	29.35	32.40	38.80	42.25	45.75	55.10	58.75
32	13.90	16.05	17.25	19 70	21.15	22.65	24.15	28 80	30.35	33.50	40 05	43.55	47.15	57.40	60.35
33	14.40	16 60	17.85	20.35	21.80	23.45	25.00	29.70	31.30	34.60	41.25	44.80	48 50	58 70	61.90
34	14.90	17.10	18.50	21.10	22.60	24.30	25.85	30.65	32.30	35.70	42.45	46 10	49 95	60 05	63.50
36	15.90	18.25	19.70	22 45	24.10	26.85	27.60	32.50	34.30	37.90	44.85	48 70	52.70	62 70	66.70
38	17.90	20.15	21.60	25.60	27 25	29.00	30.75	36.20	38.00	41.60	49.85	53.70	57.70	70 70	74.70
40	20.20	22.80	24.60	28.80	30.70	32.65	34.65	40 30	42.30	46.40	55.10	59.35	63 90	77.55	82.25
42	21.40	24.20	26 10	30.45	32.45	34.50	36.60	42.35	44.50	48.80	57.70	62.20	67.00	81.00	86.00
44	22.75	25.70	27.75	32.20	34.35	36.50	38.70	44 60	46.90	51.40	60.70	65.55	70 60	85.00	90 30
46	24.25	27.20	29 35	33 95	36.25	38.50	40.85	46.90	49.30	54.10	63.70	68.90	74 30	89.00	94.60
48	29.00	31.20	33.50	38.85	41.25	43 65	46.15	53.70	56.20	61 30	73 70	79.20	85.00	100.50	106.50
50	....	....	35.30	40.75	43.25	45.80	48.45	56.10	58.80	64.20	77.00	82 95	89 00	104.90	111.35
52	....	....	37.10	42 65	45.30	48.00	50.75	58.50	61.40	67 20	80 30	86.75	93.10	109.30	116.20
54		....	38.90	44.65	47.40	50.20	53.05	61 00	64.00	70 20	83.70	90.50	97 20	113.80	121.00
56	....	....	40 85	46.55	49.30	52.25	55.25	63 45	66.75	73.40	87.30	94.50	101 60	118.65	126.30
58	....	....	42.80	48.30	51.35	54 35	57.55	65.95	69.50	76.60	90.90	98.50	106.00	123 55	131.65
60	....	....	44.80	50.50	53.35	56.45	59.85	68.45	72.20	79.80	94.60	102.50	110 50	128.45	137.00

Code Word for Type, Heimweg.

Discounts on Application.

RULES FOR FINDING THE SPEEDS AND SIZES OF PULLEYS.

To find the diameter of driving pulley: -Multiply the diameter of the driven by the number of revolutions it should make, and divide the product by the number of revolutions of the driver.

To find the diameter of driven:—Multiply the diameter of the driver by its number of revolutions, and divide the product by the number of revolutions of the driven.

To find the number of revolutions of the driven:—Multiply the diameter of the driver by its number of revolutions, and divide by the diameter of the driven.

To find the horse power of a pulley:—Multiply the circumference of the pulley by the speed, and the product thus obtained by the width of the belt, and divide the result by 600. The quotient will be the horse power.

TELEGRAPHIC CODE

The code words used to designate the various machines on the preceding pages do not conflict with Lieber's Standard Telegraphic Code, and can, therefore, be used in connection with it without any confusion. Below will be found a selection of phrases with their corresponding code words which will, it is believed, be very convenient in ordering from this catalogue. Both words and phrases were selected from the Lieber Code which is regularly used by us and to which we would refer those desiring greater variety, or who are unable to express their meaning with the phrases given.

PRICES.

BATAHOLAS	At the price of........
BATAILLANT	At what price and how soon can you furnish........?
BATAILLON	At what price can you........?
BATALLAMOS.	At your price
BATANEADO	Cannot accept at the price
BATATEIRA	Contract price includes all cost of freight
BATFUL	Does price include........?
BATHYLLUS	Give us your best price
BATIARUM	Gross price(s)........(less........discount)
BATIOCIS	If the price cannot be reduced
BATRACINE	Name lowest price you will sell (at........)
BATTIEZ	Price(s) delivered, carriage paid along-side vessel in river.
BATTIFUOCO	Price(s) delivered, carriage paid on quay or wharf.
BATTIGIA	Price(s) delivered, carriage paid on rail
BATTISTA	Price(s) for each complete
BAUDELIO	Price(s) quoted are net
BAUDROYER	Price(s) quoted are subject to........discount
BAUERNLUST	Price does not include........
BAUERNSENF	Price includes........
BAUERSSOHN	Quote price(s) by telegraph for the following........
BAUMREICH	What is net price to us free on board?

DISCOUNTS.

BAMBOOING	2 per cent
BAMBOOZLE	2½ per cent

TELEGRAPHIC CODE—Continued.

BAMBORIUM	3 per cent
BAMBUSACEO	5 per cent
ALLUGUE	5 and 2½ per cent
BAMURES	7½ per cent
BANALIDADE	10 per cent
BANANZOLA	12½ per cent
BANASTADA	15 per cent
ALLUMELLE	15 and 10 per cent
ALLUMERAI	15, 10 and 5 per cent
BANCHEAMMO	20 per cent
BANDADER	25 per cent
ALLUMINOSO	25 and 5 per cent
ALLUMNABA	25, 5 and 2 per cent
ALLUMNAR	25 and 10 per cent
ALLUNGAMMO	25, 10 and 5 per cent
BANDDOEK	27½ per cent
BANDELETTE	30 per cent
ALLUNYABAS	30 and 5 per cent
ALLUNYAN	30 and 10 per cent
ALLUNYARIA	30, 10 and 5 per cent
ALLUNYASTE	30, 10 and 10 per cent
BANDEROLAS	33⅓ per cent
ALLUSINGO	33⅓ and 5 per cent
ALLUSIONS	33⅓ and 10 per cent
BANDGRAS	35 per cent
ALLUSORY	35 and 5 per cent
ALLUSURAM	35 and 10 per cent
BANDICOOT	37½ per cent
BANDIRLA	40 per cent
ALLUVIOUS	40 and 5 per cent
ALLUXISSEM	40 and 10 per cent
ALLUXISTI	40, 10 and 5 per cent
ALLYATEM	40 and 15 per cent
ALLYL	40 and 20 per cent
BANDOG	45 per cent
ALLZULANG	45 and 5 per cent
ALMACAERAS	45 and 10 per cent
BANDSMAN	50 per cent
ALMACHTIG	50 and 5 per cent
ALMADIA	50 and 10 per cent
ALMADRABA	50, 10 and 5 per cent
ALMAGRAL	50 and 20 per cent
ALMAGRANDO	50, 20 and 10 per cent
BANDUSIA	55 per cent
ALMAHDI	55 and 5 per cent
ALMAINHA	55 and 10 per cent
BANDWEIDE	57½ per cent
BANGARD	60 per cent

TELEGRAPHIC CODE—Continued.

ALMANCEBE	60 and 5 per cent
ALMANDRES	60 and 10 per cent
ALMANIO	60, 10 and 5 per cent
ALMANSOR	60, 10 and 10 per cent
BANGORIAN	66⅔ per cent
BANISTERS	70 per cent
ALMENADAS	70 and 5 per cent
ALMENARON	70 and 10 per cent
ALMENDRADA	70, 10 and 5 per cent
ALMENDRERO	70, 10 and 10 per cent
BANKBOEKEN	75 per cent
ALMIBARAR	75 and 5 per cent
ALMIBAREIS	75 and 10 per cent
ALMICELERA	75, 10 and 5 per cent
ALMICHLEC	75, 10 and 10 per cent
BANKHAMMER	80 per cent
ALMIRANTES	80 and 5 per cent
ALMITATIS	80, 10 per cent
ALMITIES	80, 10 and 5 per cent
ALMIZADIR	80, 10 and 10 per cent
BANKROUT	85 per cent
BANKWERKER	90 per cent

ORDERS.

AVARIER	Alter our order to....................
AVARITIA	Are greatly behind on orders
AVARONE	Are now working on your order
AVELHACAR	Can ship immediately upon receipt of order
AVELLIMUS	Cancel last order
AVELLISSEM	Cancel order (for........)
AVELLISTIS	Cancel order given in letter (of ....)
AVELLUDADO	Cancel order given in telegram (of ....)
AVENAVIMUS	Cannot cancel order
AVENGING	Cannot execute the order(s) for some time
AVERRUGO	Expect to finish order(s) in a few days (by the ....)
AVERTISSES	Has our order been shipped yet?
AVESSO	Have cancelled your order
AVILANDO	How long a time will it require to execute order?
AVINAGREIS	If we order the following............, how soon can you ship?
AVOCAVA	Orders for............ (has) (have) not arrived; by what line did you ship?
AVONDDAUW	Order(s) received; will ship on or about...........
AVONDWIND	Orders will be promptly attended to

TELEGRAPHIC CODE—Continued.

AVREBBERO	Referring to your order (No............)
AVVANGASSE	State what part of this order you can fill at once
AVVIGNO	We can ship part of your order as follows, and will furnish the balance as soon as possible
AVVINA	We hereby countermand order (bid) contained in our letter (of....................)
AVVISANDO	We shipped your order for............promptly, via............; will send tracer at once
AVVOCANO	Will send regular order by mail

SHIPMENTS.

BRINDILLA	By what route was shipment made?
BRINOSO	Commence shipment as soon as possible
BROCANTAGE	Not yet ready for shipment
BROCOLOS	Shipment(s) early next month
BRODONE	Shipment(s) next month
BROEIBAK	Shipment(s) not yet arrived
BROMIORUM	We have on hand for immediate shipment
BROMOGRAFO	What is the earliest shipment you can make?
BROOCHES	By what line will you ship?
BROODKAST	Can ship in about................from receipt of letter
BROQUIN	Cannot possibly ship the whole lot by first steamer. Shall we, therefore, wait for the next and send it all together?
BRUCIOLATO	Shall we ship by freight or express?
BRUDERSINN	Ship at once to (us) (..........)
BRUECHIG	Ship by canal
BRUECKE	Ship by canal and lake
BRUEHHEISS	Ship by cheap steamer
BRUEHKAESE	Ship by cheapest route
BRUELLAFFE	Ship by express (to..................)
BRUELLOCHS	Ship by fast freight
BRUENZEL	Ship by first steamer (to....................)
BRUETPLATZ	Ship by quickest route
BRUGEOIS	Ship by sailing vessel taking advantage of every departure until (advised to contrary) (..............)
BRUTALIBUS	are hereby ordered shipped at once (to......................)

TELEGRAPHIC CODE.

Code Words	Machine	Page
Dismount	Machine to be furnished with electric motor	322
Dispel	Machine to be adapted for electric drive, but without motor	322
Pantainha	No. 0 Screw Machine, with Automatic Chuck and Wire Feed, Style B.	68
Plywort	9-inch Jewelers' Polishing Lathe	22
Pocador	9-inch Speed Lathe	22
Pocacci	Portable Cylinder Boring Machine, 10 inches to 24 inches	162
Pocalis	10-inch Bench Lathe, 40-inch bed	23
Pocaneos	10-inch " 4 foot bed	23
Pocaribus	11-inch " 4 "	23
Pocarone	10-inch Speed Lathe, 40-inch bed	24
Pocattola	10-inch " 4 foot bed	24
Pocena	11-inch " 4 "	24
Pocenina	12-inch " 5 "	25
Pocherello	14-inch " 6 "	25
Pocillus	14-inch Hand Lathe, 6 foot bed	26
Podatum	9-inch Engine Lathe, 44-inch bed	27
Podaturam	11-inch " 5-foot bed	29
Podaturi	9-inch " 56-inch bed	27
Podaveris	11-inch " 61 "	27
Podavero	11-inch " 73 "	27
Podavisses	12-inch " 5 foot bed	34
Poddered	11-inch " 85-inch bed	27
Poddering	11-inch " 4 foot bed	28
Poderammo	11-inch " 4 "	29
Poderando	14-inch " 6 "	34
Poderarla	16-inch " 6 "	34
Poderarono	18-inch " 6 "	34
Poderassi	12-inch " 5 "	32
Poderata	14-inch " 6 "	32
Poderolla	16-inch " 6 "	32
Podicant	18-inch " 6 "	32
Podicet	12-inch Stud and Bolt Lathe, 4 foot bed	43
Podiendos	16-inch " " 5 "	43
Podientis	14-inch Engine Lathe Style E	50
Podientium	15-inch " "	50
Podinarum	16-inch " "	50
Podiremus	18-inch " "	50
Pofice	20-inch " "	50
Pofos	22-inch " "	50
Poggettina	12-inch Engine Lathe with Turret	48
Poggiarla	14-inch " "	48
Pogginess	16-inch " "	48

TELEGRAPHIC CODE—Continued.

Code Words	Machine	Page
Foggiolla	No. 2 Screw Machine, Style A	75
Fogliatura	18-inch Engine Lathe with Turret	48
Fognarono	12-inch Plain Chucking Lathe 5 foot bed	45
Fognassimo	14-inch " " 6 "	45
Fognerebbe	16-inch " " 6 "	45
Fogneresti	18-inch " " 6 "	45
Fokkesteng	13-inch Turret Lathe with Carriage, Style G	51
Fokkeseil	21-inch " " "	51
Folaghetta	24-inch " " "	51
Folatrait	28-inch " " "	51
Folatrons	34-inch " " "	51
Foldnet	17-inch Improved Fox Lathe	57
Folette	18-inch " " "	59
Folganca	18-inch Cabinet Turret Lathe	61
Folgasao	20-inch " " "	61
Folgern	12-inch Bench Forming Lathe	64
Folglich	12-inch Plain Forming Lathe	64
Folgoro	18-inch " " "	64
Folgsam	12-inch Improved Forming Lathe	65
Folguedo	18-inch " " "	65
Folhagem	Boring bar for lathe, 4 inches x 6 feet	42
Folheho	" " 4½ " x 7 "	42
Folhento	" " 5 " x 7 "	42
Folhetaria	" " 6 " x 7 "	42
Folhoso	2-inch Cone Cutting-off Machine	88
Foliaba	3-inch " " "	88
Foliaire	4-inch " " "	88
Foliated	5-inch " " "	88
Foliculo	6-inch " " "	68
Folioband	2-inch Accelerated Speed Cutting-off Machine	87
Foliolado	3-inch " " " "	87
Foliolate	4-inch " " " "	87
Foliolis	5-inch " " " "	87
Foliosam	6-inch " " " "	87
Foliosos	16x16x4 feet Planing Machine	91
Folioter	Crank Planing Machine	93
Folklore	17x17x3 feet Planing Machine	94
Folkmar	17x17x4 feet " "	94
Follebatis	22x22x4 feet " "	95
Follebunt	24x24x5 feet " "	95
Follentis	No. 12 Plain Turret Lathe, Complete	53
Folleremus	Set-over Slide and Saddle for No. 12 Plain Turret Lathe	53
Follerete	Chasing Attachment and Hand-rest for No. 12 Plain Turret Lathe	53
Folleros	Cut-off Rest for No. 12 Plain Turret Lathe	53
Folletage	No. 13 Plain Turret Lathe, Complete	53
Folletines	Set-over Slide and Saddle for No. 13 Plain Turret Lathe	53

TELEGRAPHIC CODE—Continued.

Code Words	Machine	Page
Polletista	Chasing Attachment and Hand-rest for No. 13 Plain Turret Lathe	53
Polleto	Cut-off Rest for No. 13 Plain Turret Lathe	53
Pollezza	No. 13 Geared Turret Lathe Complete	53
Pollicabas	Set-over Slide and Saddle for No. 13 Geared Turret Lathe	53
Pollicabit	Chasing Attachment and Hand-rest for No. 13 Geared Turret Lathe	53
Pollicando	Cut-off Rest for No. 13 Geared Turret Lathe	53
Pollicant	No. 14 Plain Turret Lathe, Complete	53
Pollicola	Set over Slide and Saddle for No. 14 Plain Turret Lathe	53
Pollicular	Chasing Attachment and Hand-rest for No. 14 Plain Turret Lathe	53
Polliculo	Cut-off Rest for No. 14 Plain Turret Lathe	53
Polliful	No. 14 Geared Turret Lathe, Complete	53
Polligena	Set-over Slide and Saddle for No. 14 Geared Turret Lathe	53
Polligenis	Chasing attachment and Hand-rest for No 14 Geared Tur- Lathe	53
Pollilho	Cut-off Rest for No. 14 Geared Turret Lathe	53
Pollinorum	No. 15 Plain Turret Lathe Complete	53
Pollow	Set-over Slide and Saddle for No. 15 Plain Turret Lathe	53
Pollowing	Chasing Attachment and Hand-rest for No. 15 Plain Turret Lathe	53
Poltamente	Cut-off Rest for No. 15 Plain Turret Lathe	53
Polter	No. 15 Geared Turret Lathe Complete	53
Polteraars	Set-over Slide and Saddle for No. 15 Geared Turret Lathe	53
Polterbank	Chasing Attachment and Hand-rest for No. 15 Geared Turret Lathe	53
Polterbett	Cut-off Rest for No. 15 Geared Turret Lathe	53
Polterende	No. 15½ Geared Turret Lathe Complete	53
Poltering	Set-over Slide and Saddle for No. 15½ Geared Turret Lathe	53
Polterpein	Chasing attachment and Hand-rest for No. 15½ Geared Turret Lathe	53
Polterqual	Cut-off Rest for No. 15½ Geared Turret Lathe	53
Polyoca	No. 12 Plain Turret Lathe Complete	55
Pomalhaut	Automatic Chuck for No 12 Plain Turret Lathe	55
Pomentaban	Vertical Forming Tool Slide for No. 12 Plain Turret Lathe	55
Pomentacao	Cut-off Rest for No. 12 Plain Turret Lathe	55
Pomentammo	No. 13 Plain Turret Lathe Complete	55
Pomentarala	Automatic Chuck for No. 13 Plain Turret Lathe	55
Pomentassi	Vertical Forming Tool Slide for No. 13 Plain Turret Lathe	55
Pomentato	Cut-off Rest for No. 13 Plain Turret Lathe	55
Pomentava	No. 13 Geared Turret Lathe Complete	55
Pomenter	Automatic Chuck for No. 13 Geared Turret Lathe	55
Pomenting	Vertical Forming Tool Slide for No. 13 Geared Turret Lathe	55
Pomentolla	Cut-off Rest for No. 13 Geared Turret Lathe	55
Pomentons	No. 14 Plain Turret Lathe	55
Pomentorum	Automatic chuck for No. 14 Plain Turret Lathe	55
Pomitem	Vertical Forming Tool Slide for No. 14 Plain Turret Lathe	55

TELEGRAPHIC CODE—Continued.

Code Words	Machine	Page
Fonacion	Cut-off Rest for No. 14 Plain Turret Lathe	55
Fonaciones	No. 14 Geared Turret Lathe Complete	55
Fonalidad	Automatic Chuck for No. 14 Geared Turret Lathe	55
Fonascia	18-inch Portable Valve Seat, Rotary Planing Machine	104
Foncage	22-inch " " " "	104
Foncailles	Radius Link Planer Attachment	105
Fonceau	Vertical Forming Tool Slide for No. 14 Geared Turret Lathe	55
Foncoir	26-inch Portable Valve Seat, Rotary Planing Machine	104
Fonda	10-inch Improved Planer Centers	106
Fondacaio	Cut-off Rest for No. 14 Geared Turret Lathe	55
Fondamento	No. 15 Plain Turret Lathe Complete	55
Fondassi	12-inch Improved Planer Centers	106
Fondatezza	No. 1 Universal Automatic Feed, Hand Drill	118
Fondatore	16-inch Improved Planer Centers	106
Fondatrice	Automatic Chuck for No. 15 Plain Turret Lathe	55
Fondava	6-inch Planer Chuck, round base	107
Fondavano	8-inch " " "	107
Fondeabais	Vertical Forming Tool Slide for No. 15 Plain Turret Lathe	55
Fondeadero	Cut-off Rest for No. 15 Plain Turret Lathe	55
Fondeados	10-inch Planer Chuck, round base	107
Fondearas	12-inch " " "	107
Fondearian	15-inch " " "	107
Fondearon	18-inch " " "	107
Fondeerde	No. 15 Geared Turret Lathe Complete	55
Fondello	24-inch Planer Chuck, round base	107
Fonderemmo	No. 2 Universal Automatic Feed, Hand Drill	118
Fondereste	No. 3 " " "	118
Fondiamo	No. 4 " " "	118
Fondibile	30-inch Planer Chuck, round base	107
Fondillos	6-inch Planer Chuck, square base	107
Fondime	8-inch " " "	107
Fondisses	10-inch " " "	107
Fondista	12-inch " " "	107
Fondling	15-inch " " "	107
Fondness	18-inch " " "	107
Fondons	24-inch " " "	107
Fondrier	30-inch " " "	107
Fondrilles	Automatic chuck for No. 15 Geared Turret Lathe	55
Fondront	No. 1 Hand Drill	119
Fondsen	No. 2 " "	119
Fondule	No. 3 " "	119
Fonebol	Vertical Forming Tool Slide for No. 15 Geared Turret Lathe	55
Fonetiche	Cut-off Rest for No. 15 Geared Turret Lathe	55
Fonfarao	No. 15½ Geared Turret Lathe, complete	55
Fonfone	No. 3 Portable Drilling Machine, drills ¼-inch	121
Fongible	No. 4 " " " " ½-inch	121
Fongicole	No. 4 " " " " ⅜-inch	121

TELEGRAPHIC CODE—Continued.

Code Words	Machine	Page
Fongivore	No. 5 Portable Drilling Machine, drills $\frac{15}{16}$-inch	121
Fongoide	No. 6 " " " " 1¼-inch	121
Fongueux	Automatic Chuck for No. 15½ Geared Turret Lathe	55
Fonico	No. 8 Portable Drilling Machine, drills 1⅝-inch	121
Fonicolina	No. 9 " " " " 2 -inch	121
Fonkelde	No. 8 " " " " 2½-inch	121
Fonkelende	Vertical Forming Tool Slide for No. 15½ Geared Turret Lathe	55
Fonkeling	No. 9 Portable Drilling Machine, drills 3 -inch	121
Fonneuse	No. A Portable Drilling Machine	122
Fonolite	No. B " " "	122
Fonologia	No. 1 " " "	122
Fonomania	No. 2 " " "	122
Fonometro	No. 3 " " "	122
Fononusi	No. 4 " " "	122
Fonsadera	No. 0 Screw Machine, without Automatic Chuck and Wire Feed, Style B	68
Fontaine	No. 5 Portable Drilling Machine	122
Fontalibus	Power Feed to Turret for No. 0 Screw Machine, Style B	68
Fontalis	No. 0 "Post" or "Blacksmith" Drill	125
Fontalium	No. 1 " " " "	125
Fontanales	No. 1½ " " " "	125
Fontanella	No. 2 " " " "	125
Fontaneria	No. 3 " " " "	125
Fontange	No. 4 " " " "	125
Fontanino	No. 5 " " " "	125
Fontanone	No. 6 " " " "	125
Fontanoso	No. 7 " " " "	125
Fonteinbak	No. 1 Screw Machine, without Automatic Chuck and Wire Feed. Style B	68
Fonteinen	No. 8 "Post" or "Blacksmith" Drill	125
Fontejam	No. 1 Screw Machine, with Automatic Chuck and Wire Feed, Style B	68
Fontejarum	Power Feed to Turret for No. 1 Screw Machine, Style B	68
Fonteji	No. 2 Screw Machine, without Automatic Chuck and Wire Feed, Style B	68
Fontejus	No. 2 Screw Machine, with Automatic Chuck and Wire Feed, Style B	68
Fonticola	No. 9 "Post" or "Blacksmith" Drill	125
Fonticolis	The "Boss" Post or Blacksmith Drill	125
Fonticule	Power Feed to Turret for No. 2 Screw Machine, Style B	68
Fonticulum	No. 3 Screw Machine, without Automatic Chuck and Wire Feed, Style B	68
Fontigena	No. 3 Screw Machine, with Automatic Chuck and Wire Feed, Style B	68
Fontigenis	Power feed to Turret for No. 3 Screw Machine, Style B	68
Fontinal	No. 4 Screw Machine, without Automatic Chuck, and Wire-Feed, Style B	68
Fontinalis	9 Inch Sensitive Drill	136

TELEGRAPHIC CODE—Continued.

Code Words	Machine	Page
Fonto	No. 4 Screw Machine with Automatic Chuck and Wire Feed, Style B	68
Fontyn	10-Inch Sensitive Bench Drill	127
Fonvielle	Power Feed to Turret for No. 4 Screw Machine, Style B	68
Foodful	13-Inch Sensitive Drill	129
Foodless	No. 4½ Screw Machine without Automatic Chuck and Wire Feed, Style B	68
Fooleries	1 Spindle 10-Inch Sensitive Bench Drill	131
Foolhappy	No. 4½ Screw Machine with Automatic Chuck and Wire Feed, Style B	68
Foolhardy	Power Feed to Turret for No. 4½ Screw Machine Style B	68
Foolified	No. 3 Screw Machine with Friction Geared Head without Automatic Chuck and Wire Feed, Style B	71
Foolify	No. 3 Screw Machine with Friction Geared Head with Automatic Chuck and Wire Feed, Style B	71
Foolfying	No. 3 Screw Machine with Plain Back Geared Head without Automatic Chuck and Wire Feed, Style B	71
Fooling	1 Spindle 10-Inch Sensitive Drill	131
Foolishly	No. 3 Screw Machine with Plain Back Geared Head with Automatic Chuck and Wire Feed, Style B	71
Foolscap	Power Feed to Turret for No. 3 Screw Machine Style B	71
Foolstones	Power Cross Feed to Cut-off rest for No. 3 Screw Machine, Style B	71
Fooltrap	2 Spindle 10-Inch Sensitive Drill	131
Football	No. 4 Screw Machine with Friction Geared Head without Automatic Chuck and Wire Feed, Style B	71
Footband	No. 4 Screw Machine with Friction Geared Head with Automatic Chuck and Wire Feed, Style B	71
Footbanks	3 Spindle 10-Inch Sensitive Drill	131
Footboy	No. 4 Screw Machine with Plain Back Geared Head without Automatic Chuck and Wire Feed, Style B	71
Footbridge	No. 4 Screw Machine with Plain Back Geared Head, with Automatic Chuck and Wire Feed, Style B	71
Foodcloth	Power Feed to Turret for No. 4 Screw Machine, Style B	71
Footed	Power Cross Feed to Cut-off Rest for No. 4 Screw Machine Style B	71
Footfalls	No. 4½ Screw Machine with Friction Geared Head, without Automatic Chuck and Wire Feed, Style B	71
Footgeld	4 Spindle 10-Inch Sensitive Drill	131
Foothalt	No. 4½ Screw Machine with Plain Back Geared Head, without Automatic Chuck and Wire Feed, Style B	71
Foothold	No. 4½ Screw Machine with Plain Back Geared Head with Automatic Chuck and Wire Feed, Style B	71
Foothot	1 Spindle 13-Inch Sensitive Bench Drill	131
Footlicker	Power Feed to Turret for No. 4½ Screw Machine, Style B.	71
Footlight	No. 4½ Screw Machine with Friction Geared Head, with Automatic Chuck and Wire Feed, Style B	71
Footman	1 Spindle 13-Inch Sensitive Drill	131
Footmarks	2 " 13 " " "	131
Footpace	3 " 13 " " "	131

TELEGRAPHIC CODE—Continued.

Code Words	Machine	Page
Footpaths	4 Spindle 13-Inch Sensitive Drill	131
Footplough	Power Cross Feed to Cut-off Rest for No. 4½ Screw Machine, Style B.	71
Footplows	1 Spindle 15-Inch Sensitive Drill	131
Footpost	No. 5 Screw Machine. Friction Geared Head, without Automatic Chuck and Wire Feed, Style B	71
Footprint	No. 5 Screw Machine, Friction Geared Head and Automatic Chuck and Wire Feed. Style B	71
Footrope	No. 5 Screw Machine Plain Back Geared Head, without Automatic Chuck and Wire Feed Style B	71
Footstall	No. 5 Screw Machine, Plain Back Geared Head, with Automatic Chuck and Wire Feed, Style B	71
Footstep	Power Feed to Turret for No. 5 Screw machine, Style B	71
Footstick	Power Cross Feed to Cut-off Rest for No. 5 Screw Machine, Style B.	71
Footstool	No. 5½ Screw Machine, Friction Geared Head, without Automatic Chuck and Wire Feed, Style B	71
Footvalve	No. 5½ Screw Machine, Friction Geared Head, with Automatic Chuck and Wire Feed, Style B	71
Footwaling	No. 5½ Screw Machine, Plain Back Geared Head, without Automatic Chuck and Wire Feed, Style B	71
Footway	No. 5½ Screw Machine, Plain Back Geared Head, with Automatic Chuck and Wire Feed, Style B	71
Fopling	4 Spindle 14-Inch Lever Feed Sensitive Drill	133
Foppbecher	Power Feed to Turret for No. 5½ Screw Machine, Style B	71
Foppen	1 Spindle 13-Inch Sensitive Drill, Style B	135
Foppende	2 " 14 " Lever Feed Sensitive Drill	133
Foppish	2 " 16 " Sensitive Drill, Style B	135
Foppishly	3 " 14 " Lever Feed Sensitive Drill	133
Fopptest	3 " 13 and 22-inch Sensitive Drill, Style B	135
Fopster	4 " 14 and 25 " " "	135
Forabant	6 Spindle Turret Drill	158
Forabile	21-Inch Wheel and Lever Drill	137
Forabilium	Power Cross Feed to Cut-off Rest for No. 5½ Screw Machine, Style B	71
Forabosco	No. 6 Screw Machine. Friction Geared Head, without Automatic Chuck and Wire Feed, Style B	71
Foracchia	14-Inch Upright Drill	138
Foraged	21 " "	138
Foraggia	24 " "	138
Foragginoa	No. 6 Screw Machine, Friction Geared Head, with Automatic Chuck and Wire Feed, Style B	71
Foraggiare	No. 6 Screw Machine, plain back, Geared Head, without Automatic Chuck and Wire Feed, Style B	71
Foraggiave	No. 6 Screw Machine, plain black, Geared Head, with Automatic Chuck and Wire Feed. Style B	71
Foraging	28-Inch Upright Drill	138
Foraginis	32 " "	138
Forago	40 " "	138
Foralite	50 " "	141

TELEGRAPHIC CODE—Continued.

Code Words	Machine	Page
Foramente	Power Feed to Turret for No. 6 Screw Machine, Style B	71
Foramello	Power Cross Feed to Cut-off Rest for No. 6 Screw Machine, Style B	71
Foraminato	No. 4 Electric Portable Drill	122
Forandi	Boiler Shell Drill	144
Forandos	Boiler Makers' Drill	145
Foraria	Radial Drilling and Countersinking Machine	147
Forasiso	Suspension Drill	160
Forbicinabar	Portable Locomotive Cylinder Boring Machine, 8 in. to 16 in.	163
Forbidden	" " " " " 10 in. to 20 in.	163
Forbimmo	" " " " " 10 in. to 24 in.	163
Forbotto	Portable Cylinder Boring Machine, 4 inches to 12 inches	162
Forbreak	" " " " 6 inches to 16 inches	162
Forbye	" " " " 8 inches to 22 inches	162
Forcadel	" " " " 12 inches to 30 inches	162
Forcais	" " " " 20 inches to 60 inches	162
Forcant	" " " " 20 inches to 60 inches	162
Foreasmuch	Cut-off Rest for No. 15½ Gear Turret Lathe	55
Foredo	6-inch Shaping Machine	116
Foredoomed	Pulley Drilling and Tapping Machine	83
Forefeel	8-inch Shaping Machine	116
Forefoot	10-inch "	116
Foregift	12-inch Crank Shaper	113
Foregoes	15-inch "	113
Forehew	20-inch "	113
Forehood	16-inch Quick-return Stroke Shaper, with Extension Base and Support	111
Forehorse	20-inch Quick-return Stroke Shaper, with Extension Base and Support	111
Foreking	24-inch Quick-return Stroke Shaper, with Entension Base and Support	111
Foreknow	26-inch Quick-return Stroke Shaper, with Extension Base and Support	111
Foreland	28-inch Quick-return Stroke Shaper, with Extension Base and Support	111
Forellen	32-inch Quick-return Stroke Shaper, with Extension Base and Support	111
Forensibus	8-inch Single Geared Shaper, with Outside Support	111
Forensic	12-inch " " "	111
Forepart	14-inch " " "	111
Forepeaks	18-inch " " "	111
Forfaire	No. 1 Key-seating Machine	193
Forfang	No. 2 " "	193
Forfeit	Portable Key Seater	194
Forficis	Small Hand Milling Machine	196
Forficola	Large " "	197
Forge	No. 1 Universal Milling Machine, Style B	199
Forgeron	No. 2 " " "	199

TELEGRAPHIC CODE—Continued.

Code Words	Machine	Page
Forgetful	No. 3 Universal Milling Machine, Style B	199
Forgetive	No. 4 “ “ “	199
Forgetter	No. 4½ “ “ “	199
Forgicar	No. 5 “ “ “	199
Forioso	No. 1 Swing Crane with Traveling Hoist	375
Forillo	No. 11 Tool Room Universal Milling Machine, Style B	201
Forirem	No. 12 “ “ “ “	201
Forkless	No. 13 “ “ “ “	201
Forlane	No. 14 “ “ “ “	201
Forlipon	No. 14½ “ “ “ “	201
Forlorn	No. 15 “ “ “ “ “ “	201
Formabit	No. 20 Plain Milling Machine, Style B	203
Formacao	No. 21 “ “ “	203
Formador	No. 22 “ “ “	203
Formadura	No. 24 “ “ “	203
Formage	No. 25 “ “ “	203
Formaggio	No. 26 “ “ “	203
Formalium	No. 1 Universal Milling Machine, Style C,	205
Formalize	No. 1½ “ “ “	205
Formally	No. 2 “ “ “	205
Formaron	No. 3 “ “ “	205
Formatello	No. 0 Plain Milling Machine, Style C	205
Formation	No. 1 “ “ “ “	205
Formative	No. 2 “ “ “ “	205
Formatrice	No. 3 “ “ “ “	205
Formaturos	No. 6 Horizontal Milling Machine, Style D	207
Formella	No. 6½ “ “ “ “	207
Formellis	No. 7 “ “ “ “	207
Formend	No. 8 “ “ “ “	207
Formerly	50-inch Horizontal Milling Machine, Style B	209
Formful	72-inch “ “ “ “	209
Formianos	84-inch “ “ “ “	209
Formiate	96-inch “ “ “ “	209
Formica	108-inch “ “ “ “	209
Formicaire	132-inch “ “ “ “	209
Formicosi	Vertical Spindle Milling Attachment	211
Formies	12-inch Circular Base Milling Machine Vise	216
Forminha	8-inch “ “ “	216
Formionis	6-inch “ “ “	216
Formique	5-inch “ “ “	216
Formkappo	10-inch Plain Centers	213
Formkugel	New Combination Head	213
Formloser	18-inch Cam Cutting Attachment	215
Formola	Hand Spiral Cutting Attachment	215
Formon	Cam Cutting Attachment complete	215
Formosear	Gear Cutting Attachment	213
Formosinho	Horizontal Spindle Milling Machine	217

TELEGRAPHIC CODE—Continued.

Code Words	Machine	Page
Formosorum	Vertical Spindle Milling Machine	218
Formosulos.	Two Spindle Vertical Milling Machine	219
Formosulum	No. 1 Duplex " "	220
Formosura	Heavy Standard " "	221
Formulate	8-inch Flat Milling Machine Vise	216
Formule	7-inch Extra Heavy Flat Milling Machine Vise	216
Formulions	6-inch Improved Flat Milling Machine Vise	216
Formulista.	7-inch " " " " "	216
Formvoll.	6-inch " " " " "	216
Formylene	5-inch " " " " "	216
Formzacken.	4½-inch " " " " "	216
Fornello.	No. 1 Vertical Hand Milling Machine, Complete	229
Fornice.	No. 2 " " " " complete	229
Fornitura	No. 3 Vertical Spindle " " complete	229
Fornorum.	No. 4 " " " " complete	229
Fornuolo	No. 5 " " " " complete	229
Forosella	No. 1 Vertical Hand " " without rotary	229
Forosetto.	No. 2 " " " " without rotary	229
Forpaitre	No. 3 Vertical Spindle " " without rotary	229
Forpassed	No. 4 " " " " without rotary	229
Forpine	No. 5 " " " " without rotary	229
Forquilha	Semi-Automatic Rack Cutting Machine	233
Forrabas	Entirely Automatic Rack Cutter 3 feet x 8 inches	235
Forragem	" " 6 feet x 8 inches	235
Forraran	" " 6 feet x 10 inches	235
Forraseis	Automatic Pinion or Gear Cutter	237
Forrays	Entirely Automatic Rack Cutter 10 feet x 10 inches	235
Forschen	28-inch "New Type" Entirely Automatic Gear Cutter	239
Forschung	36-inch " " "	239
Forsenno	48-inch " " "	239
Forsoothed	60-inch " " "	239
Forspoken	64-inch " " "	239
Forstgraf	72-inch " " "	239
Forstherr	50-inch " " "	239
Forstnagel	96-inch " " "	239
Forstzins	120-inch " " "	239
Fortium	22-inch Regular " "	241
Fortlet	30-inch " " "	241
Fortnight	36-inch " " "	241
Fortore	50-inch " " "	241
Fortraire	60-inch " " "	241
Fortsatz	74-inch " " "	241
Fountful	18-inch Automatic Gear Cutting Machine	243
Fourbe	24-inch " "	243
Fourbir	36-inch " "	243
Fourche	48-inch " "	243
Fourchon	60-inch " "	243

TELEGRAPHIC CODE—Continued.

Code Words	Machine	Page
Fourm	No. 1 Shop Saw, with Automatic Feed	246
Fourmont	No. 2 " " "	246
Fournache	No. 4 " " "	246
Fournaise	No. 8 " " "	246
Fourneaux	No. 5 Portable Rail Saw	247
Fournimes	No. 5 A " "	247
Fourrage	No. 6 " "	247
Fourrer	No. 6 A " "	247
Foussier	No. 10 Metal Sawing Machine	252
Foutief	No. 15 " "	252
Fovela	No. 20 " "	252
Fovelarum	No. 15 " " with Circular Base	254
Fovente	No. 2 Cold Cutting-off Saw	249
Foveole	No. 3 " " "	249
Fragatao	1-inch Single Bolt Cutter	259
Fragatinha	1-inch Double "	259
Frage	1¼-inch Single "	259
Fragelle	1¼-inch Double "	259
Fragesatz	1½-inch Single "	259
Fragescas	1½-inch Double "	259
Fragewort	2-inch Single "	259
Fragifere	2 -inch Double "	259
Fragil	2¼-inch Single "	259
Fragilely	2½-inch " "	259
Fragiles	3 -inch " "	259
Fragilibus	3½-inch " "	259
Fragilidad	4 -inch " "	259
Fragilimo	5 -inch " "	259
Fragilitas	6 -inch " "	259
Frailly	1 -inch 4 Spindle Nut Taper	262
Frainesa	1 -inch 6 " "	262
Fraisage	1½-inch 4 " "	262
Fraiser	1½-inch 6 " "	262
Fraiserat	1½-inch 4 " "	262
Fraisoir	1½-inch 6 " "	262
Francavate	¾-inch Bolt Header	264
Francesco	1 -inch " "	264
Franchado	1¼-inch " "	264
Franchezza	1½-inch " "	864
Francici	1 -inch Heading, Upsetting & Forging Machine	265
Francien	1½-inch " " "	265
Francisca	2 -inch " " "	265
Francollo	2½-inch " " "	265
Francorum	3 -inch " " "	265
Francotes	3½-inch " " "	265
Franduno	5 -inch " " "	265
Frangalho	6 -inch " " "	265

TELEGRAPHIC CODE—Continued.

Code Words	Machine	Page
Frayeras	Improved Horizontal Tapping Machine	263
Frayonne	Hand Pipe Threading and Cutting-off Machine	270
Frazangue	Power Pipe Threading and Cutting-off Machine	270
Frazione	No. 2 Foot Press, with Gibbed Slide on Table	390
Freccio	No. 2 Pipe Cutting and Threading Machine	269
Freccione	No. 2 " " "	269
Freccioso	No. 3 " " "	269
Frecheiro	No. 3 " " "	269
Frechhans	No. 4 " " "	269
Frechheit	No. 1 Hand Shear	274
Frechmaul	No. 2 "	274
Frechmuth	No. 3 "	274
Frechsten	No 4 "	274
Freckled	No. 5 "	274
Frecuencia	No. 4 Pipe Cutting and Threading Machine	269
Frecuentes	No. 6 " " "	269
Fredame	No. 6 Hand Shear	274
Freddammo	No. 6 Pipe Cutting and Threading Machine	269
Freddando	No. 7 "	274
Freddarono	No. 8 Pipe Cutting and Threading Machine	269
Freddassi	No. 8 Hand Shear	274
Freddata	No. 18 Pipe Cutting and Threading Machine	269
Freddavamo	No. 10 " " "	269
Freddavate	No. 10 " " "	269
Fredderai	No. 12 " " "	269
Freddezza	Revolving Die Attachment for No. 2 Machine	269
Freddiate	" " No. 3 "	269
Freddiccio	" " No. 4 "	269
Freddoloso	" " No. 6 "	269
Fredduzzo	No. 1 Hand Punch	274
Fredegar	No. 2 "	274
Fredegisus	Die Plate for 8-inch Machine	269
Fredegonde	" " 10-inch "	269
Frederico	No. 3 Hand Punch	274
Fredonnais	No. 4 Hand Punch	274
Fredonne	No. 5 Hand Punch	274
Fredonnons	Die Plate for 12-inch Machine	269
Fredstole	No. 6 Hand Punch	274
Fredulpho	No. 7 "	274
Fregabais	No. 8 "	274
Fregaban	No. 0 Fly Wheel, Solid Frame Punching Press	395
Fregabacao	No. 1 " " "	395
Fregado	No. 2 " " "	395
Fregamos	No. 3 " " "	395
Fregandola	No. 4 " " "	395
Fregarono	No. 5 " " "	395
Fregataire	No. 1 Combined Hand Shear and Punch	274

TELEGRAPHIC CODE—Continued.

Code Words	Machine	Page
Fregate	No. 2 Combined Hand Shear and Punch	274
Fregatina	No. 3 " " " "	274
Fregatrix	No. 4 " " " "	274
Fregatten	No. 5 " " " "	274
Fregavate	No. 6 " " " "	274
Fregellae	No. 7 " " " "	274
Fregellis	No. 8 " " " "	274
Freiarche	No. 1 Geared Solid Frame Punching Press	395
Freibank	No. 2 " " "	395
Freibaum	No. 3 " " "	395
Freibrief	No. 4 " " "	395
Freiduras	No. 5 " " "	395
Freimarke	No. 10 Adjustable Incline Press	397
Freimos	No. 15 " "	397
Freimuth	No. 18 " "	397
Freindre	No. 19 " "	397
Freinte	No. 20 " "	397
Freiport	No. 21 " "	397
Fremito	No. 725 Straight-Sided Press	399
Fremoris	No. 735 " "	399
Fremoso	No. 745 " "	399
Fremuisti	No. 755 " "	399
Frenandas	No. 765 " "	399
Frenzy	No. 2 Plain Single Acting Open Back Press	393
Frequent	No. 3 " " "	393
Freres	No. 3½ " " "	393
Fresadas	No. 4 " " "	393
Fresando	No. 5 " " "	393
Frescava	No. 6 " " "	393
Frescoed	No. 7 " " "	393
Frescoso	No. 8 " " "	393
Fresnal	No. 4 Geared " "	393
Fresorum	No. 5 " " "	393
Fresquel	No. 6 " " "	393
Fressgier	No. 7 " " "	393
Fresslust	No. 8 " " "	393
Fries	No. 9 Punching and Shearing Machine	283
Friesrock	No. 8 " "	283
Friesstab	No. 7 " "	283
Friezes	No. 6 " "	283
Frigdaria	No. 5 " "	283
Frigdoris	No. 4 " "	283
Frigedinis	No. 3 " "	283
Frigerate	No. 2 " "	283
Frigescet	No. 1 " "	283
Friggessi	No. A " "	283
Friggiate	No. B " "	283

TELEGRAPHIC CODE—Continued.

Code Words	Machine	Page
Friggo	No. C Punching and Shearing Machine	283
Frighten	No. D " "	283
Frightful	No. E " "	283
Frigidato	No. F " "	283
Frigidite	No. G " "	283
Frigidly	No. H " "	283
Frigidorum	Single Boiler Punch	284
Frigios	No. 4 Horizontal Punch	291
Frigorabat	No. 4 Horizontal Punching and Bending Machine	292
Frigorabis	No. 3 " " "	292
Frigoravi	No. 2 " " "	292
Frigorific	No. 1 " " "	292
Frigoris	No. 3 Horizontal Punch	291
Frigoule	No. 2 " "	291
Frigousse	No. 1 " "	291
Friguttias	No. A " "	291
Frileux	No. B " "	291
Frilinge	No. A Horizontal Punching and Bending Machine	292
Frimaire	No. B " " "	292
Frimousser	No. C Horizontal Punch	291
Fricha	No. C Horizontal Punching and Bending Machine	292
Frinfino.	No. D " " "	292
Fringale	No. D Horizontal Punch	291
Fringant	No. 4 Plate Splitting and Cross Cutting Shear	288
Fringeless	Style A Heavy I Beam Punching Machine, Belt Driven	285
Fringilago	Style B " " " "	285
Fringille	No. 3 Plate Splitting and Cross Cutting Shear	288
Fringillis	Style C Heavy I Beam Punching Machine, Belt Driven	285
Fringillum	Style D " " " "	285
Fringnagel	Style E " " " "	285
Fringuella	Style F " " " "	285
Fringuer	No. 2 Plate Splitting and Cross Cutting Shear	288
Friniates	No. 1 " " "	288
Frinio	No. A " " "	288
Frinire	No. B " " "	288
Friniva	No. C " " "	288
Frioulan	No. D " " "	288
Fripais	No. 4 Angle Iron Shear	290
Friper	No. 3 " "	290
Fripiez	No. 2 " "	290
Fripons	No. 1 " "	290
Frisado	No. A " "	290
Frisant	No. B " "	290
Friscello	No. C " "	290
Frisch	No D " "	290
Frischen	No. E " "	290
Friskal	No. 4 Medium Multiple Punching Machine	295

TELEGRAPHIC CODE—Continued.

Code Words	Machine	Page
Frislet	No. 3 Medium Multiple Punching Machine	295
Frisotte	Heavy Multiple and I Beam Punch, Belt Driven	286
Frisquet	Heavy Multiple and I Beam Punch, Engine Driven	286
Frisson	No. 2 Medium Multiple Punching Machine	295
Fristen	No. 1 " "	295
Frithly	Style A Heavy Multiple "	297
Fritillary	Single Heavy Steam Driven Cross-cut Shear	289
Frittage	Style B Heavy Multiple Punching Machine	297
Frittende	Style C " "	297
Friturier	Style D " "	297
Frivole	Style E " "	297
Frivolite	Style F " "	297
Frivolous	Style G " "	297
Frixabas	Medium Single Automatic Spacing Machine	298
Frixabitis	Automatic Trimmer, Beveler, Spacer and Punch, Hand Feed	299
Frixantes	Automatic Trimmer, Beveler, Spacer and Punch, Power Feed	299
Frixaverit	Hydraulic Punching Machine	302
Frixavisse	Hydraulic Shearing Machine	302
Frixerat	No. 4 Gate Shearing Machine	293
Frixisti	No. 3 " "	293
Frizada	No. 2 " "	293
Frizz	No. 1 " "	293
Frizzly	No. A Heavy Gate Shear	294
Froberge	No. B " "	294
Frocard	No. C " "	294
Frochot	No. D " "	294
Frocks	No. E " "	294
Frodasse	No. F " "	294
Froebel	No. G " "	294
Froehlich	Style A Heavy I Beam Punching Machine, Engine Driven	285
Froehnen	Style B " " "	285
Froehnerei	Style C " " "	285
Froemmer	Style D " " "	285
Froemmling	Style E " " "	285
Froere	Style F " " "	285
Frohnwald	Style A Heavy Splice Bar Punch, Belt Driven	287
Frohnzins	Style B " " "	287
Frohsinn	Style C " " "	287
Froissais	Style E " " "	287
Froisses	Style D " " "	287
Froisseur	Style F " " "	287
Frolado	Style G " " "	287
Frolenca	Style H " " "	287
Froler	Style A Heavy Splice Bar Punch, Engine Driven	287
Frolicful	Style B " " "	287
Frolicking	Style C " " "	287

TELEGRAPHIC CODE—Continued.

Code Words	Machine	Page
Frolicsome	Style D Heavy Splice Bar Punch, Engine Driven	327
Frolics	Style E “ “ “	327
Frolions	Style F “ “ “	327
Frolovie	Style G “ “ “	327
Frolyes	Style H “ “ “	327
Fromba	Hydraulic Flanging Press	319
Fronche	Clark's Improved Boiler-head Flanging Machine	321
Fundivel	500-pound Overhead Tramway	364
Fundort	1,000 “ “	364
Fundorten	1,500 “ “	364
Fundorum	2,000 “ “	364
Fundulum	3,000 “ “	364
Fundura	4,000 “ “	364
Funebre	6,000 “ “	364
Funebrial	8,000 “ “	364
Funebris	10,000 “ “	364
Funerals	500—1,000-pound Overhead Tramway with Channel Beam Rail	365
Funerammo	2,000—3,000-pound Overhead Tramway with Channel Beam Rail	365
Funerarono	4.000—6,000-pound Overhead Tramway with Channel Beam Rail	365
Funerassi	8,000—10,000-pound Overhead Tramway with Channel Beam Rail	665
Funeratura	40-ton Stationary Hydraulic Riveter 6-feet Gap	341
Funereal	40-ton “ “ 8-feet 6-inches “	341
Funereos	40-ton “ “ 10-feet 6-inches “	341
Funerepis	40-ton “ “ 12-feet “	341
Funeriate	40-ton “ “ 6-feet “	341
Fungato	2-ton Hand Traveling Crane, Span 12 feet to 14 feet	371
Funge	2-ton “ “ “ 16 “ 19 “	371
Fungebaris	2-ton “ “ “ 20 “ 24 “	371
Fungebatur	2-ton “ “ “ 25 “ 30 “	371
Fungeerde	3-ton “ “ “ 12 “ 15 “	371
Fungendis	3-ton “ “ “ 16 “ 19 “	371
Fungentem	3-ton “ “ “ 20 “ 24 “	371
Fungheto	3-ton “ “ “ 25 “ 30 “	371
Fungible	4-ton “ “ “ 12 “ 15 “	371
Fungico	4-ton “ “ “ 16 “ 19 “	371
Fungina	4-ton “ “ “ 20 “ 24 “	371
Fungitur	5-ton “ “ “ 12 “ 14 “	371
Fungor	5-ton “ “ “ 15 “ 18 “	371
Fungosity	5-ton “ “ “ 19 “ 22 “	371
Fungoso	4-ton Hand Power Traveling Crane, Span 21 feet to 25 feet	373
Fungous	4-ton “ “ “ 26 “ 30 “	373
Fungulos	4-ton “ “ “ 31 “ 35 “	373
Funibus	5-ton “ “ “ 20 “ 25 “	373

TELEGRAPHIC CODE—Continued.

Code Words	Machine	Page
Funicella	5-ton Hand Power Traveling Crane, Span 26 feet to 30 feet	373
Funichio	5 ton " " " 31 " 35 "	373
Funicolare	6-ton " " " 16 " 19 "	373
Funiculo	6-ton " " " 20 " 23 "	373
Funiforme	6-ton " " " 24 " 27 "	373
Funingue	6-ton " " " 28 " 31 "	373
Funkelten	6-ton " " " 32 " 35 "	373
Funkite	8-ton " " " 16 " 19 "	373
Funklig	8-ton " " " 20 " 23 "	373
Funnily	8-ton " " " 24 " 27 "	373
Fuocara	8-ton " " " 28 " 31 "	373
Fuorche	8-ton " " " 32 " 35 "	373
Furabor	10-ton " " " 16 " 19 "	373
Furacibus	10-ton " " " 20 " 23 "	373
Furacity	10-ton " " " 24 " 28 "	373
Furanter	10-ton " " " 29 " 34 "	373
Furatim	Portable Chain Hoist, 500 pounds	368
Furatori	" " 1,000 "	368
Furatrici	" " 2,000 "	368
Furbaccio	" " 3,000 "	368
Furbelow	" " 4,000 "	368
Furberia	" " 6 000 "	368
Furbesco	" " 8,000 "	368
Furbishes	" " 30,000 "	368
Furbo	" " 10,000 "	368
Furcaire	" " 20,000 "	368
Furcate	" " 12,000 "	368
Furcation	" " 16,000 "	368
Furcelle	50-ton Stationary Hydraulic Riveter, 6-feet Gap	341
Furchig	50-ton " " 8-feet 6-inches "	341
Furcifere	50-ton " " 10-feet 6-inches "	341
Furcillis	50-ton " " 12-feet "	341
Furcosi	50-ton " " 17-feet "	341
Furcraea	75-ton " " 6-feet "	341
Furcula	75-ton " " 8-feet 6-inches "	341
Furculis	75-ton " " 10-feet 6-inches "	341
Furdles	100-ton " " 6-feet "	341
Furentis	100-ton " " 8-feet 6-inches "	341
Furetiere	100-ton " " 10-feet 6-inches "	341
Furfando	75-ton " " 12-feet "	341
Furfasse	Style A Hoist, 500 lbs	367
Furfatore	" " 1000 "	367
Furfavamo	" " 2000 "	367
Furfavate	" " 3000 "	367
Furferanno	" " 4000 "	367
Furferebbe	" " 6000 "	367
Furferemo	" " 8000 "	367

TELEGRAPHIC CODE—Continued.

Code Words	Machine	Page
Furferesti	Style A Hoist 10,000 "	367
Furfero	" " 12,000 "	367
Furfurem	" " 16,000 "	367
Furfureos	" " 20,000 "	367
Furfuris	" " 24,000 "	367
Furfurol	" " 30,000 "	367
Furgault	Style "A" Plain Trolley, 1 ton	367
Furgon	" " 1½ "	367
Furiabit	" " 2 "	367
Furiabitis	" " 3 "	367
Furiabunt	" 4 "	367
Furiaccia	" " 5 "	367
Furialiter	" " 6 "	367
Furiandi	Style "B" Geared Trolley, 1 "	367
Furiandos	" " 1½ "	367
Furiarent	" " 2 "	367
Furiatile	" " 3 "	367
Furiatilis	" " 4 "	367
Furiaturum	" " 5 "	367
Furiaverat	" " 6 "	367
Furlong	No. 2 Swing Crane with Traveling Hoist	375
Furlough	No. 3 " " "	375
Furmint	No. 4 " " "	375
Furnaceis	No. 5 " " "	375
Furolle	Pressure Pump 4½ inches x ¾ inches x 4 inches	359
Furoncello	" 4½ " 2½ " 4 "	359
Furoncolo	" 5¼ " ¾ " 5 "	359
Furonis	" 5¼ " 3 " 5 "	359
Furono	" 6 " ¾ " 6 "	359
Furore	" 6 " 3½ " 6 "	359
Furrelique	Bridge or Girder Riveter	325
Furriel	Pressure Pump 7½ inches x ¾ inches x 6 inches	359
Furrily	" 7½ " 4 " 6 "	359
Furrina	" 7½ " 2¼ " 10 "	359
Furrings	" 9 " 3 " 10 "	359
Furrows	" 10 " 3¾ " 10 "	359
Furtacor	" 12 " 4½ " 10 "	359
Furtafogo	" 14 " 5 " 10 "	359
Furtapasso	" 16 " 5½ " 10 "	359
Furthered	" 18½ " 6 " 10 "	359
Furthering	" 20 " 7 " 10 "	359
Furthest	" 25 " 7¾ " 10 "	359
Furtificae	" 10 " 2¼ " 15 "	359
Furtificis	" 12 " 3¾ " 15 "	359
Furtivas	" 14 " 4½ " 15 "	359
Furtively	" 17 " 5½ " 15 "	359
Furtivo	" 20 " 6½ " 15 "	359

TELEGRAPHIC CODE—Continued.

Code Words	Machine	Page
Furuncle	Pressure Pump 25 inches x 7¾ inches x 15 inches	359
Furvos	Style A 10 -inch Lever Riveter	329
Furvum	" A 11½-inch "	329
Fusain	" B 10 -inch "	329
Fusaiole	" B 11½-inch "	329
Fusarion	Hydraulic Fire-door Riveter	333
Fuscabat	Lever-type Portable Riveter	335
Fuscabis	25 -inch Bridge or Girder Riveter	327
Fuscandi	34½-inch " "	327
Fuscandos	55 -inch " "	327
Fuscantem	36 -inch " "	327
Fuscator	Rotary Tapping and Drilling Machine	349
Fuscaturi	Stay Bolt Cutter	351
Fuscavi	Stay Bolt Breaker	353
Fuscellino	The 'New Boyer" Pneumatic Hammer	354
Fusciano	Mud-Ring Riveter	331
Fuscinula	Lever-type Riveter and Jib Crane	337
Fuscite	Direct-acting Portable Riveter	339
Fuscous	Steam Riveting Machine	343
Fuselli	Riveting Tower Crane	345
Fusilero	Air Hoist Diameter of Cylinder, 3 inches	355
Fusilibus	" " " 4 "	355
Fusilien	" " " 5 "	355
Fusillade	" " " 6 "	355
Fusiller	" " " 7 "	355
Fusillies	" " " 8 "	355
Fusillions	" " " 9 "	355
Fusinae	" " " 10 "	355
Fusion	" " " 12 "	355
Fusionamos	" " " 14 "	355
Fusionando	" " " 16 "	355
Fusionar	" " " 18 "	355
Fusionaron	" " " 20 "	355
Fusionases	" " " 22 "	355
Fusioneis	" " " 24 "	355
Fusionibus	" " " 26 "	355
Fusionismo	" " " 28 "	355
Fusionista	" " " 30 "	355
Fusipore	10-in. x 7-in. x 6-in. Duplex Belt Driven Air Compressor	357
Fusivel	14-in. x 9-in. x 8-in. " " "	357
Fuselana	16-in. x 10-in. x 12-in. " " "	357
Fusoliera	18-in. x 12-in. x 12-in. " " "	357
Fusorio	Accumulator	361
Ganga	No. 0000 Steel Pressure Blower	379
Gangabis	No. 00 " "	379
Gangamon	No. 0 " "	379
Gangart	No. 1 " "	379

TELEGRAPHIC CODE—Continued.

Code Words	Machine	Page
Gangbett	No. 2 Steel Pressure Blower	379
Gangers	No. 3 “ “	379
Gangetidis	No. 4 “ “	379
Gangfisch	No. 5 “ “	379
Ganghauer	No. 6 “ “	379
Ganghero	No. 7 “ “	379
Gangliao	No. 8 “ “	379
Gangorra	No. 9 “ “	379
Gangoso	No. 10 “ “	379
Gangzug	No. 1 Steel Pressure Blower	381
Ganhador	No. 2 “ “	381
Ganhanca	No. 3 “ “	381
Ganhavel	No. 4 “ “	381
Ganientis	No. 5 “ “	381
Ganitre	No. 6 “ “	381
Ganizes	No. 7 “ “	381
Gannille	No. 8 “ “	381
Gannys	No. 9 “ “	381
Ganoga	No. 10 “ “	381
Ganosos	No. 11 “ “	381
Ganozze	No. 11½ “ “	381
Gansette	No. 12 “ “	381
Gantzeit	No. 0000 Counter-shaft for Steel Pressure Blower	383
Ganymede	No. 00 “ “ “	383
Ganymedis	No. 0 “ “ “	383
Ganzebout	No. 1 “ “ “	383
Ganzelever	No. 2 “ “ “	383
Ganzeneb	No. 3 “ “ “	383
Ganzenok	No. 4 “ “ “	383
Gazenoog	No. 5 “ “ “	383
Ganzenpoel	No. 6 “ “ “	383
Ganzenvet	No. 7 “ “ “	383
Ganzepe	Nos. 8 and 9 “ “ “	383
Ganzepoot	Nos. 9 and 10 “ ‘ “	383
Ganzopfer	No. 30 Heating Forge, 8 x 10 inches	387
Ganzpacht	No. 31 “ 12 x 12 “	387
Ganztaegeg	No. 32 “ 13½ x 22 “	387
Ganzton	No. 33 “ 12 x 20 “	387
Ganzuas	No. 34 “ 12 x 44 “	387
Ganzwelt	No. 35 “ 8 x 22 “	387
Gaouri	No. 36 “ 18 x 40 “	387
Garach	No. 37 “ 18 x 4 “	387
Garachide	No. 38 “ 24 x 24 “	387
Garaguay	No. 0s Stationary Blast Forge	388
Garalhada	No. 1s “ “	388
Garamas	No. 02 “ “	388
Garambas	No. 00s “ “	388

TELEGRAPHIC CODE—Continued.

Code Words	Machine	Page
Garamone	No. 03 Stationary Blast Forge	388
Garantirla	No. 1 Improved Portable Forge	385
Garantisco	No. 2 " "	385
Garantisme	No. 3 " "	385
Garantissi	No. 4 " "	385
Garantito	No. 5 " "	385
Garapino	No. 0 Power Forge with Water Tank	389
Gararoba	No. 0 Power Forge without Water Tank	386
Garasa	No. 0 Power Forge with Water Tank and Hand-power Attachment	386
Garatos	No. 0 Power Forge with Hand Power and without Water Tank	386
Garauna	No. 1 Four-poppet Drop Press	391
Garavato	No. 1½ " "	391
Garbaccio	150 x 200-pound Power Drop Hammer	403
Garbancera	300 x 400 " " "	403
Garbanzal	450 x 550 " " "	403
Garbanzos	600 x 750 " " "	403
Garbatone	800 x 1.000 pound Power Drop Hammer	403
Garbatone	1050 x 1300 " "	403
Garbeaba	1350 x 1650 " "	403
Garbosos	15-pound Upright Cushioned Strap Hammer	405
Garboteau	30 " " "	405
Garbuglio	50 " " "	405
Garbullos	75 " " "	405
Garcaille	100 " " "	405
Garcinia	125 " " "	405
Garcon	150 " " "	405
Gardasses	200 " " "	405
Gardenly	300 " " "	405
Gardiaan	500 " " "	405
Garela	15 " Rubber Cushioned Helve Hammer	407
Garenbleek	25 " " "	407
Garendoos	40 " " "	407
Garenklos	60 " " "	407
Garenmolen	80 " " "	407
Garenprop	100 " " "	407
Garenrol	200 " " "	407
Garfearian	25 " Improved Upright Power Hammer	409
Garfearon	30 " " "	409
Garfilha	40 " " "	409
Garfios	50 " " "	409
Garfish	60 " " "	409
Garfuana	80 " " "	409
Gargagha	90 " " "	409
Gargale	100 " " "	409
Gargalho	125 " " "	409

TELEGRAPHIC CODE—Continued.

Code Words	Machine	Page
Gargalise	150 " Improved Upright Power Hammer	409
Gargalone	200 " " "	409
Gargaridis	50 " Single Standard Pneumatic Power Hammer	411
Gargarisme	75 " " " "	411
Gargarizar	100 " " " "	411
Gargarizo	150 " " " "	411
Gargoil	Double Stand Steam Drop Hammer	413
Gargote	150-pound Patent Single Stand Steam Hammer	415
Gargouille	250 " " "	415
Gargousse	400 " " "	415
Gargoyles	600 " " "	415
Gargozza	800 " " "	415
Garguero	1,100 " " "	415
Garheit	1.250 " " "	415
Garherd	1 500 " " "	415
Gariandro	2,000 " " "	415
Garidelle	2,500 " " "	415
Gariofilo	1,100-pound Patent Double Stand Steam Hammer	417
Garishly	1,500 " " "	417
Garishness	2,000 " " "	417
Garissoles	2,500 " " "	417
Gariteros	3,000 " " "	417
Garites	4,000 " " "	417
Garnvald	5,000 " " "	417
Garizim	6,000 " " "	417
Garknecht	8,000 " " "	417
Garouille	No. 7 Horizontal Bending or Forming Machine	421
Garoupa	No. 6 " "	421
Garous	No. 5 " "	421
Garpa	No. 4 " "	421
Garpfanne	No. 3 " "	421
Garprobe	No. 2 " "	421
Garracicao	No. 1 " "	421
Garafales	No. A " "	421
Garrafinha	No. B " "	421
Garrafones	No. C " "	421
Garrana	No. D " "	421
Garrientis	No. 1 Bulldozer Bending or Forming Machine	423
Garrierunt	No. 2 " "	423
Garrigue	No. 3 " "	423
Garrirai	No. 4 " "	423
Garriremus	No. 5 " "	423
Garrirono	No. 6 " "	423
Garrisco	No. 7 " "	423
Gaudebas	No. 1 Grinding Machine	433
Gaudebit	No. 2 "	433
Gaudelia	No. 3 "	433

TELEGRAPHIC CODE—Continued.

Code Words	Machine	Page
Gaudery	No. 4 Grinding Machine	433
Gaudful	No. 5 "	433
Gaudha	No. 6 "	433
Gaudialis	No. 7 "	433
Gaudieb	No. 8 "	433
Gaudiosa	26-inch Improved Automatic Knife Grinder	435
Gaudivis	30-inch " " "	435
Gaudriole	36-inch " " "	435
Gaufou	Automatic Cross Feed for Knife Grinder	435
Gaufre	Automatic Pump and Connections for Knife Grinder	435
Gaufror	Countershaft for Knife Grinder	435
Gaukel	No. 1 Automatic Surface Grinding Machine	437
Gaulette	No. 2 " "	437
Gaulish	No. 3 " "	437
Gaulode	No. 4 " "	437
Gaumen	No. 1 Single Wheel Tool Grinder	439
Gaunaca	No. 2 " "	439
Gaunacis	No. 3 " "	439
Gauranus	No. 4 " "	439
Gauros	No. 5 " "	439
Gausser	No. 1 Face Grinding Machine	441
Gauwdief	No. 2 " "	441
Gauwerds	No. 3 " "	441
Gauwort	No. 4 Face Grinding Machine	441
Gauzy	No. 5 " "	441
Gavarati	Automatic Pump and Connections for Face Grinding Machine	441
Gavardie	Adjustable Cup Wheel Holder for Face Grinding Machine	441
Gavarro	Automatic Feed for Face Grinding Machine	441
Gavelock	No. 1 Universal Grinding Machine, Style D	443
Gaverick	No. 2 " " "	443
Gavial	No. 3 " " "	443
Gawair	No. 1 " " Style L	447
Gazeboo	No. 2 " " "	447
Gazeful	No. 3 " " "	447
Gazellen	No. 3a " " "	447
Gazelon	No. 4 " " "	447
Gazeo	No. 4a " " "	447
Gazetici	No. 5 " " "	447
Gazeux	No. 6 " " "	447
Gazifero	Universal Cutter and Tool Grinder	448
Gazipaes	No. 1 Correct Water Gear Cutter Grinder	449
Gaziva	No. 2 " " "	449
Gazmiar	No. 1 Twist Drill Grinder, Style A	451
Gazmieis	No. 1 " " " B	451
Gazmol	No. 1 " " " C	451
Gazola	No. 2 " " " A	451

TELEGRAPHIC CODE—Continued.

Code Words	Machine	Page
Gasolyte	No. 2 Twist Drill Grinder, Style B	451
Gasometre	No. 2 " " " C	451
Gasoso	Bench Cutter Grinder	454
Gasusa	Universal Tool-grinding Machine	453
Gassarra	Saw Sharpening Machine	455
Geada	Rotary Attachment for Bench Cutter Grinder	454
Geaehrt	8-Inch Polishing Head, 6-inch x 9-inch base	457
Geaeste	10 " " 8-inch x 12-inch base	457
Geangeld	12 " " 9½-inch x 15-inch base	457
Geankert	12 " " 16-inch x 21-inch base	457
Geants	14 " " 20-inch x 27-inch base	457
Gearbeid	15 " " 11-inch x 18-inch base	457
Gebellt	24 x 3½ Iron Grindstone Frame	426
Gebet	26 x 3½ " "	426
Gebeugt	30 x 3½ " "	426
Gebieten	36 x 4 " "	426
Gebiger	40 x 4 " "	426
Gefrage	Bench Tool Grinder with 10 x 1-inch Wheel	428
Gefrieren	" " " 10 x 2-inch "	428
Gefrit	Countershaft for Bench Tool Grinder	428
Gefroren	Adjustable Angle Rest for Bench Tool Grinder	428
Gefuege	Adjustable Angle Rest with Traverse Table for Bench Tool Grinder	428
Gegrut	8-inch Emery Grinder	431
Gegulpt	10-inch "	431
Gegund	12-inch "	431
Gehalsd	14-inch "	431
Gehalten	16-inch "	431
Gehaltlos	18-inch "	431
Gekheid	Size A Patent Countershaft	459
Gekibbel	Size B "	459
Gekicher	Size C "	459
Gekippt	Size D "	459
Gekittet	Size E "	459
Gekkende	Size F "	459
Gekker	Size G "	459
Geklappt	Size H "	459
Geklebt	Size I "	459
Geklim	Size J "	459
Geklirr	Size K "	459
Geklopft	Size L "	459
Geklutst	Emery Wheel	461
Gekoer	20-inch Double Belted Surface Planer	465
Gekolkt	24-inch " "	465
Gekonnt	28-inch " "	465
Gekeraut	8-inch Improved Hand Jointer or Buzz Planer	467
Gekrevel	12-inch " " "	467

TELEGRAPHIC CODE—Continued.

Code Words	Machine	Page
Gekriel	16-inch Improved Hand Jointer or Buzz Planer	467
Gekroese	24-inch " " "	467
Gekskap	Scroll Saw	469
Gekurkt	24-inch Improved Band Saw Machine	471
Gekust	30-inch " "	471
Gekwakt	34-inch " "	471
Gekweel	36-inch " "	471
Gelaafd	37-inch " "	471
Gelable	42-inch " "	471
Gelalla	36-inch x 44-inch Saw-bench	472
Gelapt	Style 1 Horizontal Boring Machine	473
Gelati	Style 2 " "	473
Gelatos	16-inch Iron-bed Pattern Maker's Lathe	475
Gelatum	20-inch " "	475
Gelaturi	24-inch " "	475
Gelbgans	New Pattern Post-boring Machine	476
Gelbreif	Steam Glue Heater	477
Geldig	Portable Locomotive Brass Facer	480
Geldnarr	No. 2 Greenerd Arbor Press	481
Geldnoth	No. 3 " "	481
Geldpost	No. 3½ " "	481
Geldra	No. 4 " "	481
Geleira	Turning Machine for Finishing Shafting from ¾ to 2-inch diameter	488
Geleisig	Revolving Roll Straightener for Finishing Shafting ¾ to 2 inches diameter	488
Gelenk	Press Straightener for Finishing Shafting from ¾ to 2-inch diameter	488
Geleund	Turning Machine for Finishing Shafting from 1½ to 5½ inches diameter	588
Gelhas	Revolving Roll Straightener for Finishing Shafting 1½ to 5½-inches diameter	488
Geliate	Press Straightener for Finishing Shafting from 1½ to 5½ inches diameter	488
Gelidity	Combination Shafting Straightener and Centers	489
Geliloth	No. 1 Improved Automatic Sand Sifter	490
Gelions	No 2 " "	490
Gellert	No. 1 Hand Reaming Machine	491
Gellius	No. 2 " "	491
Gelockt	No. 1 Centrifugal Oil Separator	492
Gelodert	No. 2 " "	492
Gelonos	Patent Parallel Vise	493
Gelontis	Patent Swivel Filers' Vise	493
Gelosia	4 -inch Heavy Chipping Vise	494
Gelsomino	5 " "	494
Geltchen	6½ " "	494
Geltstag	8 " "	494

TELEGRAPHIC CODE—Continued.

Code Words	Machine	Page
Gelullt	Heavy Chipping Vise without Swivel Bottom Attachment	495
Gelust	" " with " "	495
Gemeos	6 -inch New Independent Jaw Chucks, 3 Jaws	497
Gemeranno	7½-inch " " "	497
Gemeresti	9 -inch " " "	497
Gemetzel	12 -inch " " "	497
Gemevate	15 -inch " " "	497
Gemidora	18 -inch " " "	497
Geminal	21 -inch " " "	497
Geminous	24 -inch " " "	497
Gemirias	6 -inch " " 4 Jaws	497
Gemiront	7½-inch " " "	497
Gemiscet	9 -inch " " "	497
Gemitivo	10 -inch " " "	497
Gemmabit	12 -inch " " "	497
Gemmacao	14 -inch " " "	497
Gemmaio	15 -inch " " "	497
Gemmante	16 -inch " " "	494
Gemmary	18 -inch " " "	497
Gemmels	20 -inch " " "	497
Gemmeous	21 -inch " " "	497
Gemmeur	22 -inch " " "	497
Gemmosis	24 -inch " " "	497
Gemmoso	26 -inch " " "	497
Gemmule	28 -inch " " "	497
Gemmulis	30 -inch " " "	497
Gemokerd	32 -inch " " "	497
Gemuit	Size 4, Four Jaw Independent Lathe Chuck	499
Gemulos	" 6 " " "	499
Gemulum	" 8 " " "	499
Gemunkel	" 10 " " "	499
Gemurre	" 12 " " "	499
Gemursis	" 14 " " "	499
Gemzen	" 16 " " "	499
Genaast	" 18 " " "	499
Genageld	" 20 " " "	499
Genannt	" 22 " " "	499
Genappe	" 24 " " "	499
Genarque	" 26 " " "	499
Genarum	" 28 " " "	499
Genascht	" 30 " " "	499
Genasses	" 36 " " "	499
Genau	" 42 " " "	499
Gencive	" 10 " " " Heavy Pattern	499
Gendarme	" 12 " " " "	499
Gendrage	" 14 " " " "	499
Genealog	" 16 " " " "	499

TELEGRAPHIC CODE—Continued.

Code Words	Machine	Page
Genearch	Size 18 Four Jaw Independent Lathe Chuck, Heavy Pattern	499
Genebra	" 20 " " " "	499
Genehm	" 22 " " " "	499
Geneigt	" 24 " " " "	499
Genero	Size 3 Universal Lathe Chuck, 3 Jaws	501
Generons	" 4 " " "	501
Genesial	" 6 " " "	501
Genesio	" 9 " " "	501
Genesung	" 12 " " "	501
Genetkat	" 15 " " "	501
Genetzt	" 18 " " "	501
Geneutel	" 21 " " "	501
Genevan	" 24 " " "	501
Genevese	" 27 " " "	501
Genevois	" 30 " " "	501
Gengeli	" 36 " " "	501
Gengiva	" 4 " " 4 Jaws	501
Genraler	" 6 " " "	501
Genially	" 9 " " "	501
Geniazo	" 12 " " "	501
Genick	" 15 " " "	501
Genicoli	" 18 " " "	501
Geniculo	" 21 " " "	501
Geniepig	" 24 " " "	501
Genieux	" 27 " " "	501
Genimen	" 30 " " "	501
Genimina	" 36 " " "	501
Halfacht	4-inch Universal Two-Jaw Chuck, Style F	502
Halfbad	5-inch " " "	502
Halfdek	6-inch " " "	502
Halfdrie	8-inch " " "	502
Halfest	9-inch " " "	502
Halfgod	12-inch " " "	502
Halfman	15-inch " " "	502
Halfness	18-inch " " "	502
Halfpint	21-inch " " "	502
Halfpond	24 inch " " "	502
Halfslag	4-inch Independent Two-Jaw Chuck, Style F	502
Halftern	5-inch " " "	502
Halftwee	6-inch " " "	502
Halfvier	8 inch " " "	502
Halfzes	9-inch " " "	502
Halfzuil	12-inch " " "	502
Halhul	15-inch " " "	502
Halictus	18-inch " " "	502
Halique	21-inch " " "	502
Halladas	24-inch " " "	502

TELEGRAPHIC CODE—Continued.

Code Words	Machine	Page
Halsweh	4-inch Universal Two-Jaw Chuck, Style G	502
Halswond	5-inch " " "	502
Halsseel	6-inch " " "	502
Haltbar	8-inch " " "	502
Halterio	9-inch " " "	502
Haltica	12-inch " " "	502
Haltlos	15-inch " " "	502
Haltort	4-inch Independent Two-Jaw Chuck, Style G	502
Haltritt	5-inch " " "	502
Haltzeil	6-inch " " "	502
Haltstelle	8-inch " " "	502
Haltung	9-inch " " "	502
Halurgie	12-inch " " "	502
Halvans	15-inch " " "	502
Hamarum	8-inch Heavy Pattern Cutting-off Chuck, Style E, 3 Jaws	503
Hamastris	9-inch " " " " "	503
Hamatos	12-inch " " " " "	503
Hamaux	14-inch " " " " "	503
Hamaxa	17-inch " " " " "	503
Hambelien	20-inch " " " " "	503
Hambrear	8-inch Heavy Pattern Cutting-off Chuck, Style E, 4 Jaws	503
Hambrege	9-inch " " " " "	503
Hambutte	12-inch " " " " "	503
Hamearis	14-inch " " " " "	503
Hamecon	17-inch " " " " "	503
Hamelvet	20-inch " " " " "	503
Hamilla	7-inch Two-Jawed Box Body Chuck	508
Hamkin	9-inch " " "	508
Hammath	12-inch " " "	508
Hammered	15-inch " " "	508
Hammevet	Extra Slip Iron Jaws for 7-inch Two-Jawed Box Body Chuck	508
Hammon	Extra Slip Iron Jaws for 9-inch Two-Jawed Box Body Chuck	508
Hamula	Extra Slip Iron Jaws for 12-inch Two-Jawed Box Body Chuck	508
Hamum	Extra Slip Iron Jaws for 15-inch Two-Jawed Box Body Chuck	508
Hamsa	Extra Slip Cast Steel Jaws for 7-inch Two-Jawed Box Body Chuck	508
Hanani	Extra Slip Cast Steel Jaws for 9-inch Two-Jawed Box Body Chuck	508
Hanapes	Extra Slip Cast Steel Jaws for 12-inch Two-Jawed Box Body Chuck	508
Hanche	Extra Slip Cast Steel Jaws for 15-inch Two-Jawed Box Body Chuck	508
Hancornie	6-inch Combination Lathe Chucks, 3 Jaws	505
Handbahre	9-inch " " "	505

TELEGRAPHIC CODE—Continued.

Code Words		Machine	Page
Handblatt	12 -inch	Combination Lathe Chucks, 8 Jaws	505
Handblow	15 -inch	" " "	505
Handboog	18 -inch	" " "	505
Handbuch	21 -inch	" " "	505
Handdruck	24 -inch	" " "	505
Handelst	27 -inch	" " "	505
Handelten	30 -inch	" " "	505
Handeuvel	36 -inch	" " "	505
Handfrohn	42 -inch	" " "	505
Handful	6 -inch	Combination Lathe Chucks, 4 Jaws	505
Handgarn	9 -inch	" " "	505
Handgeld	12 -inch	" " "	505
Handgicht	15 -inch	" " "	505
Handgriff	18 -inch	" " "	505
Handgrith	21 -inch	" " "	505
Handhaben	24 -inch	" " "	505
Handhoch	27 -inch	" " "	505
Handicap	30 -inch	" " "	505
Handily	36 -inch	" " "	505
Handiness	42 inch	" " "	505
Handjar	2½-inch	Geared Scroll Chuck, 3 Jaws, one set of Jaws	507
Handjeri	3 -inch	" " " " "	507
Handjevol	4 -inch	" " " " "	507
Handkauf	5 -inch	" " " " "	507
Handketle	6 -inch	" " " " "	507
Handkorb	7½-inch	" " " " "	507
Handkuss	9 -inch	" " " " "	507
Handlinie	12 -inch	" " " " "	507
Handlohn	15 -inch	" " " " "	507
Handloom	2½-inch	Geared Scroll Chuck, 3 Jaws, two sets of Jaws	507
Handlung	3 -inch	" " " " "	507
Handmagd	4 -inch	" " " " "	507
Handmaiden	5 -inch	" " " " "	507
Handmandel	6 -inch	" " " " "	507
Handmesser	7½-inch	" " " " "	507
Handmolen	9 -inch	" " " " "	507
Handmuff	12 -inch	" " " " "	507
Handpaard	15 -inch	" " " " "	507
Handpalm	2½-inch	Reversible Geared Scroll Chuck, 3 Jaws	507
Handpers	3 -inch	" " "	507
Handpfahl	4 -inch	" " "	507
Handpferd	5 -inch	" " "	507
Handpomp	6 -inch	" " "	507
Handpresse	7½-inch	" " "	507
Handpumpe	9 -inch	" " "	507
Handrail	12 -inch	" " "	507
Handrolle	15 -inch	" " "	507

TELEGRAPHIC CODE—Continued.

Code Words		Machine	Page
Handross	3	-inch Geared Scroll Chuck, 4 Jaws, one set of Jaws	507
Handruthe	4	-inch " " " " "	507
Handsack	5	-inch " " " " "	507
Handsaege	6	-inch " " " " "	507
Handsalbe	7½	-inch " " " " "	507
Handschlag	9	-inch " " " " "	507
Handschuh	12	-inch " " " " "	507
Handseife	15	-inch " " " " "	507
Handsel	3	-inch Geared Scroll Chuck, 4 Jaws, two sets of Jaws	507
Handshoe	4	-inch " " " " "	507
Handsiegel	5	-inch " " " " "	507
Handsome	6	-inch " " " " "	507
Handspaak	7½	-inch " " " " "	507
Handspring	9	-inch " " " " "	507
Handstaves	12	-inch " " " " "	597
Handstroke	15	-inch " " " " "	507
Handstufe	3	-inch Geared Scroll Chuck, 4 Jaws, reversible	507
Handtasche	4	-inch " " " "	507
Handteller	5	-inch " " " "	507
Handtight	6	-inch " " " "	507
Handtrom	7½	-inch " " " "	507
Handtrouw	9	-inch " " " "	507
Handvat	12	-inch " " " "	507
Handvest	15	-inch " " " "	507
Hanebalk	30	-inch Car Wheel Chuck, 3 Jaws	509
Hanekam	36	-inch " " "	509
Hanekop	42	-inch " " "	509
Hanepoot	48	-inch " " 6 Jaws	509
Hanglip	8	-inch New Face Plate Jaws, one set of 3 solid Jaws	511
Hangriem	10	-inch " " " " "	511
Hangslot	12	-inch " " " " "	511
Hangstoel	8	-inch New Face Plate Jaws, one set of 3 reversible Jaws	511
Hanguane	10	-inch " " " " "	511
Hangwang	12	-inch " " " " "	511
Hangwite	8	-inch New Face Plate Jaws, one set of 4 solid Jaws	511
Hanipou	10	-inch " " " " "	511
Hankered	12	-inch " " " " "	511
Hankles	8	-inch New Face Plate Jaws, one set of 4 reversible Jaws	511
Hannai	10	-inch " " " " "	511
Hannelar	12	-inch " " " " "	511
Haneart	No. 11	New Model Drill Chuck	512
Hanska	No. 12	" "	512
Hanssop	No. 13	" "	512
Hapering	No. 000	Union Drill Chuck	513
Hapern	No. 00	" "	513
Haplaire	No. 100	" "	513
Haplessly	No. 101	" "	513

TELEGRAPHIC CODE—Continued.

Code Words	Machine	Page
Haplope	No. 102 Union Drill Chuck	513
Harmoge	One Set to 2-inch Straight Tail Dogs	514
Harmoste	One Full Set Straight Tail Dogs	514
Harmvoll	Small Set Light Steel Dogs	514
Harnacher	Full Set Light Steel Dogs	514
Harneros	One small set of 8, Heavy Steel Dogs	515
Harnisch	One set of 12, Heavy Steel Dogs	515
Harnruhr	Full set of 19, " "	515
Harnstoff	Double Tail Lathe Dog	515
Harong	Full set Mechanics' Clamps	516
Harpaga	Full set Fitters' Clamps	516
Harpar	Set of 4 Patent Clamp Dogs	517
Harpist	Steel Boiler Clamp	517
Harro	Full set New Vise Clamps	518
Harsha	Full set of Standard Wrenches	519
Harstoel	Patent Bolt Dog, set of 12	519
Harssalf	Full set of Cash Iron Jack Screws	520
Hartais	New Expanding Mandrel, Amateurs' Size	520
Hartall	No. 1 New Expanding Mandrel, Machinists' Size	520
Hartaran	No. 2 " " "	520
Hartasgo	No. 3 " " "	520
Hartine	No. 4 " " "	520
Hartklep	No. 5 " " "	520
Hartoor	Full Set Steel Chuck Drill Holders	521
Hartsinn	Full Set Improved Adjustable Blocking	521
Heido	All-wrought Steel Split Pulleys	523
Heimweg	Patent Iron Split Pulleys	525
Macadamize	60-inch Driving Wheel Lathe without Quartering Attachment	3
Macaroni	60-inch Driving Wheel Lathe with Single Quartering Attachment	3
Mace	60-inch Driving Wheel Lathe with Double Quartering Attachment	3
Maceration	66-inch Driving Wheel Lathe without Quartering Attachment	3
Mackerel	66-inch Driving Wheel Lathe with Single Quartering Attachment	3
Mackintosh	66-inch Driving Wheel Lathe with Double Quartering Attachment	3
Madhouse	69-inch Driving Wheel Lathe without Quartering Attachment	3
Madly	69-inch Driving Wheel Lathe with Single Quartering Attachment	3
Madness	69-inch Driving Wheel Lathe with Double Quartering Attachment	3
Magazine	79-inch Driving Wheel Lathe without Quartering Attachment	3
Maggot	79-inch Driving Wheel Lathe with Single Quartering Attachment	3

TELEGRAPHIC CODE—Continued.

Code Words	Machine	Page
Magic.	79-inch Driving Wheel Lathe with Double Quartering Attachment	3
Magician	84-inch Driving Wheel Lathe without Quartering Attachment	3
Magistrate	84-inch Driving Wheel Lathe with Single Quartering Attachment	3
Magnetic	84-inch Driving Wheel Lathe with Double Quartering Attachment	3
Magnolia	90-inch Driving Wheel Lathe without Quartering Attachment	3
Magpie.	90-inch Driving Wheel Lathe with Single Quartering Attachment	3
Maiden.	90-inch Driving Wheel Lathe with Double Quartering Attachment	3
Maintainer.	Car Wheel Lathe	5
Majesty	Double Cutting-off and Centering Machine	15
Majority	Single Axle Lathe	11
Makable	Double Axle Lathe	9
Makebate	Locomotive Axle Lathe	7
Maladdress	36-inch Car Wheel Borer, with Powei Crane	13
Maladroit	36-inch Car Wheel Borer, with Power Crane and Power Hub Facer	13
Malady	42-inch Car Wheel Borer, with Power Crane	13
Malapari.	72-inch Quartering Machine	17
Malapert.	42-inch Car Wheel Borer, with Power Crane and Power Hub Facer	13
Malaptere.	84-inch Quartering Machine	17
Malaqueta.	100-inch " "	17
Malcontent	No. 1 Hydrostatic Wheel Press	19
Malediction	No. 2 " "	19
Malefactor	No. 3 " "	19
Malignant.	No. 2 Screw Machine	73
Mallard	No. 3 " "	74
Malice.	No. 4 Hydrostatic Wheel Press	19
Malicious	No. 5 " "	19
Malicorium.	No. 6 " "	19
Mangle.	22-inch Engine Lathe, 8 foot bed	36
Manliness	24-inch " " 8 "	36
Maple	26-inch " " 10 "	26
Marline	28-inch " " 10 "	36
Marshland	30-inch " " 12 "	36
Masker.	32-inch " " 12 "	36
Mate	36-inch " " 12 "	36
Mattress	38-inch " " 12 "	36
Mayoralty.	42-inch " " 14 "	36
Mealy	48-inch " " 14 "	36
Medicaster	54-inch " " 16 "	36
Medley	60 inch " " 16 "	36

TELEGRAPHIC CODE—Continued.

Code Words	Machine	Page
Melody	72-inch Engine Lathe 16 foot bed	26
Mergulus	38-inch Forge Lathe, 12 "	36
Merlon	50-inch " " 16 "	36
Meteor	68-inch " " 16 "	36
Microbia	Lathe Taper Attachment	41
Microcebe	26 x 26 x 8 foot Horizontal Milling Machine	225
Microchloe	36 x 36 x 12 foot " " "	225
Microciona	48 x 36 x 12 foot " " "	225
Microcline	50 x 36 x 12 foot " " "	225
Micrcoone	60 x 48 x 12 foot " " "	225
Microdon	Horizontal Duplex Milling Machine	226
Microgram	26 x 26 x 8 foot Vertical Milling Machine	228
Micrograph	36 x 36 x 12 foot " " "	228
Microhn	48 x 36 x 12 foot " " "	228
Microlepes	50 x 36 x 12 foot " " "	228
Microlicia	60 x 48 x 12 foot " " "	228
Micromega	No. 6 Vertical Milling Machine	230
Middle	26 x 26 x 6 foot Planing Machine	98
Midge	26 x 26 x 7 foot " "	98
Midget	26 x 26 x 8 foot " "	98
Midland	26 x 26 x 10 foot " "	98
Midriff	32 x 32 x 6 foot " "	98
Midships	32 x 32 x 8 foot " "	98
Midwinter	32 x 32 x 10 foot " "	98
Mighty	32 x 32 x 12 foot " "	98
Migrate	32 x 32 x 14 foot " "	98
Mild	38 x 38 x 8 foot " "	98
Mildew	38 x 38 x 10 foot " "	98
Milepost	38 x 38 x 12 foot " "	98
Milestone	38 x 38 x 14 foot " "	98
Militant	38 x 38 x 16 foot " "	98
Militaron	42 x 42 x 10 foot " "	98
Militate	42 x 42 x 12 foot " "	98
Militatore	42 x 42 x 14 foot " "	98
Militavona	42 x 42 x 16 foot " "	98
Milite	42 x 42 x 18 foot " "	98
Milk	44 x 44 x 10 foot " "	98
Milkboy	44 x 44 x 12 foot " "	98
Milker	44 x 44 x 14 foot " "	98
Milkmaid	44 x 44 x 16 foot " "	98
Milkman	44 x 44 x 18 foot " "	98
Minaret	48 x 48 x 10 foot " "	98
Mincing	48 x 48 x 12 foot " "	98
Mincingly	48 x 48 x 14 foot " "	98
Mindful	48 x 48 x 16 foot " "	98
Miner	48 x 48 x 18 foot " "	98
Mineral	48 x 48 x 20 foot " "	98

TELEGRAPHIC CODE—Continued.

Code Words	Machine	Page
Minstrelsy	54 x 54 x 10 foot Planing Machine	99
Mintage	54 x 54 x 12 foot “ “	99
Miracle	54 x 54 x 14 foot “ “	99
Miraculous	54 x 54 x 16 foot “ “	99
Mirror	54 x 54 x 18 foot “ “	99
Mirth	54 x 54 x 20 foot “ “	99
Miserable	60 x 60 x 12 foot “ “	99
Misery	60 x 60 x 14 foot “ “	99
Misfortune	60 x 60 x 16 foot “ “	99
Misgive	60 x 60 x 18 foot “ “	99
Mishap	60 x 60 x 20 foot “ “	99
Mistletoe	72 x 72 x 12 foot “ “	99
Mistress	72 x 72 x 14 foot “ “	99
Mistrust	72 x 72 x 16 foot “ “	99
Mistrustful	72 x 72 x 18 foot “ “	99
Mistune	72 x 72 x 20 foot “ “	99
Mode	84 x 84 x 16 foot “ “	99
Modeling	84 x 84 x 18 foot “ “	99
Moderate	84 x 84 x 20 foot “ “	99
Modesty	84 x 84 x 24 foot “ “	99
Moistness	96 x 96 x 16 foot “ “	99
Molar	96 x 96 x 18 foot “ “	99
Mole	96 x 96 x 20 foot “ “	99
Molecular	96 x 96 x 24 foot “ “	99
Mongrel	120 x 120 x 16 foot “ “	99
Monitor	120 x 120 x 18 foot “ “	99
Monitory	120 x 120 x 20 foot “ “	99
Monkey	120 x 120 x 24 foot “ “	99
Monsoon	144 x 144 x 16 foot “ “	99
Morbid	36-inches x 12-inches x 12-feet Frog and Switch Planing Machine	101
Morbidly	36-inches x 12-inches x 15-feet Frog and Switch Planing Machine	101
Morphine	36-inches x 36-inches x 12- feet Frog and Switch Planing Machine	101
Morsel	36-inches x 36-inches x 15-feet Frog and Switch Planing Machine	101
Mortuary	No. 1 Plate Planing Machine, 14-feet, with plain rest	103
Mosaic	No. 1 “ “ 14-feet, with compound rest	103
Moslem	No. 1 “ “ 16-feet, with plain rest	103
Mosque	No. 1 “ “ 16-feet, with compound rest	103
Mosquito	No. 1 “ “ 18-feet, with plain rest	103
Moth	No. 1 “ “ 18-feet, with compound rest	103
Motherly	No. 1 “ “ 20-feet, with plain rest	103
Motion	No. 1 “ “ 20-feet, with compound rest	103
Motto	16 -inch Traveling-head Shaping Machine, single head	115
Mould	16 -inch “ “ double head	115

TELEGRAPHIC CODE—Continued.

Code Words	Machine	Page
Mound	18 -inch Traveling-head Shaping Machine, single head	115
Mountain	18 -inch " " " double head	115
Mourn	24 -inch " " " single head	115
Mournful	24 -inch " " " double head	115
Mouse	6½-inch Slotting Machine	187
Mouthful	10 -inch "	187
Movable	14 -inch "	187
Mover	16 -inch "	187
Mucid	18 -inch "	187
Mucilage	20 -inch "	187
Muckea	24 -inch "	187
Muckerei	26 -inch "	187
Mucus	30 -inch "	187
Mucusino	36 -inch "	187
Mudada	40 -inch "	187
Muddy	54 -inch "	187
Muddying	Frame " Two Heads	189
Mudeel	" " Three Heads	189
Mudfish	37-inch Vertical Boring and Turning Mill	177
Mudflat	37-inch Vertical Boring and Turning Mill, with 2 Heads, Right Hand Head facing Machine Standard. and Left Hand Head arranged with Independent Drive for boring	177
Mudstone	37-inch Vertical Boring and Turning Mill. with 2 Heads, Right Hand Head facing Machine Standard, and Left Hand Head arranged with Chasing Attachment	177
Muffin	51-inch Vertical Boring and Turning Mill	177
Muflone	51-inch Vertical Boring and Turning Mill, with 2 Heads. Right Hand Head facing Machine Standard. and Left Hand Head arranged with Chasing Attachment	177
Mufflig	51-inch Vertical Boring and Turning Mill with 2 heads, Right Hand Head facing Machine Standard, and Left Hand Head arranged with Independent Drive for boring	177
Mulatto	60-inch Vertical Boring and Turning Mill	180
Mule	6-foot " "	180
Muleteer	7-foot " "	180
Mulish	8-foot " "	180
Mullet	10-foot " "	180
Multiform	12-foot " "	180
Mumble	14 foot " "	180
Mummy	16-foot " "	180
Munch	10 - 16-foot " " 66 in. under rail	180
Munching	10 - 16-foot " " 90 in. "	180
Mundame	14 - 20-foot " " 66 in. "	180
Municipal	14 - 20-foot " " 96 in. "	180
Murder	16 - 24-foot " "	180
Muscular	Mill to have Slotting Attachment	180
Museum	Mill to have Pulley Turning Attachment	180
Music	30-inch Vertical Turret and Boring Machine	183
Musical	30-inch Vertical Turret Boring and Turning Machine	183

TELEGRAPHIC CODE—Continued.

Code Words	Machine	Page
Musician	Chord Boring Machine	173
Musket	No. 1 Cylinder Boring Machine	169
Muskmelon	No. 2 " "	169
Muslin	No. 3 " "	169
Mustachial	No. 4½ " "	169
Mustang	No. 5 " "	169
Mutely	No. 6 " "	169
Mutilate	No. 1 Horizontal Boring and Drilling Machine	165
Mutilation	No. 2½ " " "	165
Muting	No. 3 " " "	165
Mutton	No. 4 " " "	165
Mutual	Machine with Power Cross Feed	165
Mutuary	Machine with Circular Table	165
Mutuato	Machine with Circular Table operated by worm wheel	165
Mutulos	Machine with Chasing Attachment	165
Myriad	No. 5 Horizontal Boring, Drilling and Milling Machine, 9 feet x 6-feet	167
Myrtle	No. 5 Horizontal Boring, Drilling and Milling Machine, 12 feet x 8-feet	167
Mysceli	No. 3 Horizontal Boring, Drilling and Milling Machine, 8 feet x 4-feet	167
Myscellus	No. 9 Horizontal Boring, Drilling and Milling Machine, 10 feet x 5-feet	167
Myscole	No. 10 Horizontal Boring, Drilling and Milling Machine, 10 feet x 6-feet	167
Myself	No. 11 Horizontal Boring, Drilling and Milling Machine, 10 feet x 8-feet	167
Nag	No. 3 Vertical Drilling Machine, 30 inches	143
Naively	No. 4 " " 40 inches	143
Naked	No. 5 " " 50 inches	143
Nakedly	No. 6 " " 60 inches	143
Nameless	No. 1 Radial "	149
Namesake	No. 1 Radial Drilling Machine with Swiveling Head and Rotating Arm	149
Nape	No. 1½ Radial Drilling Machine	149
Napkin	No. 1½ Radial Drilling Machine with Swiveling Head and Rotating Arm	149
Naptha	No. 2 Radial Drilling Machine	149
Narcotic	No. 2 Radial Drilling Machine with Swiveling Head and Rotating Arm	149
Narratio	No. 4 Radial Drilling Machine	149
Narration	Six Spindle Arch-bar Drilling Machine	155
Narrative	No. 3 Radial Drilling Machine	149
Narrativos	No. 5 " "	149
Narwhal	Eight Spindle Arch-bar Drilling Machine	155
Nasality	Four Spindle Multiple Drilling Machine	151
Nastiness	Six " "	151
Native	Multiple Drilling and Tapping Machine	153
Naturalist	Two Spindle Rail Drilling Machine	157

TELEGRAPHIC CODE—Continued.

Code Words	Machine	Page
Nature	Three Spindle Rail Drilling Machine	157
Natureless	Four " " "	157
Naughtiness	40-inch Pulley Lathe	79
Naughty	50-inch "	79
Nauseate	60-inch "	79
Nautical	50-inch Pulley Boring Machine	81
Naval	60-inch " "	81
Nearchos	No. 2 Power Bending Rolls 48 inches x $\frac{5}{16}$ inch without Rolls	305
Neat	No. 2 " " 48 inches x $\frac{5}{16}$ inch with Rolls	305
Neatified	No. 2 " " 60 inches x $\frac{1}{4}$ inch "	305
Neatify	No. 2 " " 60 inches x $\frac{1}{4}$ inch without Rolls	305
Neckatee	No. 3 " " 6 feet x $\frac{3}{8}$ inch "	305
Neckcloth	No. 3 " " 6 feet x $\frac{3}{8}$ inch with Rolls	305
Neckerei	No. 3 " " 8 feet x $\frac{3}{8}$ inch without Rolls	305
Necklace	No. 3 " " 8 feet x $\frac{3}{8}$ inch with Rolls	305
Neckland	No. 3 " " 10 feet x $\frac{3}{8}$ inch without Rolls	305
Necktie	No. 3 " " 10 feet x $\frac{3}{8}$ inch with Rolls	305
Nectarial	No. 4 " " 10 feet x $\frac{5}{8}$ inch without Rolls	305
Nectarine	No. 4 " " 10 feet x $\frac{5}{8}$ inch with Rolls	305
Nefarious	No. 4 " " 12 feet x $\frac{5}{8}$ inch "	305
Nefastas	No. 4 " " 12 feet x $\frac{5}{8}$ inch without Rolls	305
Neige	No. 5 " " 10 feet x $\frac{3}{4}$ inch "	305
Neighing	No. 5 " " 10 feet x $\frac{3}{4}$ inch with Rolls	305
Neptune	No. 5 " " 12 feet x $\frac{5}{8}$ inch "	305
Neptunide	No. 5 " " 12 feet x $\frac{5}{8}$ inch without Rolls	305
Nerves	No. 5 " " 12 feet x $\frac{3}{4}$ inch with Rolls	305
Nerveux	No. 5 " " 12 feet x $\frac{3}{4}$ inch without Rolls	305
Nervous	No. 5 " " 14 feet x $\frac{5}{8}$ inch with Rolls	305
Nervule	No. 5 " " 14 feet x $\frac{5}{8}$ inch without Rolls	305
Nestcocks	No. 5 " " 16 feet x $\frac{3}{4}$ inch "	305
Nestegg	No. 5 " " 16 feet x $\frac{1}{2}$ inch with Rolls	305
Nettle	No. 6 " " 16 feet x $\frac{5}{8}$ inch "	305
Nettlewort	No. 6 " " 16 feet x $\frac{5}{8}$ inch without Rolls	305
Neutral	No. 6 " " 16 feet x $\frac{3}{4}$ inch with Rolls	305
Neutrius	No. 6 " " 16 feet x $\frac{3}{4}$ inch without Rolls	305
Newsman	No. 6 " " 16 feet x 1 inch with Rolls	305
Newsroom	No. 6 " " 16 feet x 1 inch without Rolls	305
Nicemant	No. 6 " " 18 feet x $\frac{5}{8}$ inch "	305
Nicety	No. 6 " " 18 feet x $\frac{5}{8}$ inch with Rolls	305
Nickel	No. 6 " " 18 feet x $\frac{3}{4}$ inch "	305
Nickeler	No. 6 " " 18 feet x $\frac{3}{4}$ inch without Rolls	305
Nickname	No. 6 " " 18 feet x 1 inch with Rolls	305
Nicknaming	No. 6 " " 18 feet x 1 inch without Rolls	305
Niggardish	No. 6 " " 20 feet x $\frac{5}{8}$ inch "	305
Niggardly	No. 6 " " 20 foot x $\frac{5}{8}$-inch. with Rolls	305
Nightcap	No. 6 " " 20 foot x $\frac{3}{4}$-inch, " "	305
Nightengale	No. 6 " " 10 foot x 1 -inch, " "	305

TELEGRAPHIC CODE—Continued.

Code Words	Machine	Page
Nightish	No. 6 Power Bending Rolls 10 foot x 1 -inch, without Rolls	305
Nightless	No. 6 " " 20 foot x ¾-inch, " "	305
Nightmare	No. 6 " " 12 foot x 1 -inch, with Rolls	305
Nightward	No 6 " " 12 foot x 1 -inch, without Rolls	305
Nihilisme	No. 8 " " " "	305
Nihilist	No. 8 " " 20 foot x ¾-inch, with Rolls	305
Nimbleness	No. 10 " " 20 foot x ¾-inch, " "	305
Nimbless	No. 10 " " without Rolls	305
Nimbose	No. 11 " " " "	305
Nimious	No. 11 " " 20 foot x ¾-inch, with Rolls	305
Nitrifies	Vertical Power Bending Rolls, 10 foot x 1½-inch, with Rolls	305
Nitrifying	Vertical Power Bending Rolls 10 foot x 1½-inch, without Rolls	305
Nitrous	No. 12 Power Bending Rolls, 20 foot x ¾.inch, with Rolls	305
Nitrum	No. 12 Power Bending Rolls, without Rolls	305
Nobody	48-inch x 3/16-inch Plate Straightening Machine	317
Nocturnal	60-inch x ¼-inch " " "	317
Nodder	48-inch x ⅜-inch " " "	317
Noisome	48-inch x ½-inch " " "	317
Noisy	60-inch x ½-inch " " "	317
Nomad	48-inch x ⅝-inch " " "	317
Nomadic	48-inch x 1 -inch " " "	317
Nominate	Grindstone Box, with Dresser	427
Nomineh	Grindstone Box, with Stone and Dresser	427
Nonentity	Shaft Straightening Machine, 20 foot bed	483
Nonesuch	" " " 22 foot bed	483
Nonianus	" " " 24 foot bed	483
Nonidi	" " " 26 foot bed	483
Nonnado	" " " 28 foot bed	483
Nonnam	" " " 30 foot bed	483
Novelist	60-inch x ⅝-inch Plate Straightening Machine	317
Novelty	90-inch x ½-inch " " "	317
Nowhere	60-inch x 1 -inch " " "	317
Noxious	84-inch x ¾-inch " " "	317
Nozzle	120-inch x ¾-inch " " "	317
Numbskull	No. 6 Power Bending Rolls, 14 feet x ¾ inch with Rolls	305
Numen	No. 6 " " 14 feet x ¾ inch without Rolls	305
Nunnery	No. 6 " " 14 feet x 1 inch with Rolls	305
Nunqua	No. 6 " " 14 feet x 1 inch without Rolls	305
Nuptial	No. 4½ " " 8 feet x ½ inch with Rolls	305
Nuptiator	No. 4½ " " 8 feet x ½ inch without Rolls	305
Nurse	No. 4½ " " 10 feet x ⅜ inch with Rolls	305
Nurseries	No. 4½ " " 10 feet x ⅝ inch without Rolls	305
Nursery	No. 4½ " " 10 feet x ⅝ inch with Rolls	305
Nursinos	No. 4½ " " 10 feet x ⅜ inch without Rolls	305
Nursinum	No. 4½ " " 12 feet x ½ inch "	305
Nursling	No. 4½ " " 12 feet x ½ inch with Rolls	305

TELEGRAPHIC CODE—Concluded.

Code Words	Machine	Page
Pinturn	Patent Portable Crank-Pin Turning Machine	181

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